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AERIAL AGE WEEKLY

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National Guard Aviation Officers to Receive Training at Army Aviation Schools and to Receive Same Pay as Regular Army Officers

Regulations Governing Organization of the Aero Companies of the National Guard

Report of the British Advisory Committee for Aeronautics

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NATIONAL GUARD AVIATION OFFICERS TO RECEIVE TRAINING AT ARMY AVIATION SCHOOLS AND TO RECEIVE SAME PAY AS REGULAR ARMY OFFICERS

THE hundreds of National Guardsmen who have applied to the Aero Club of America for assistance to get aviation training can now receive aviation training at the Army Aviation Schools, according to a letter received by the Aero Club of America from Major-General A. L. Mills, Chief of the Militia Bureau of the War Department at Washington. And while training in aviation the Guardsmen will receive the same pay.

General Mills' letter says, in part:

"Officers and enlisted men of the National Guard who are recommended for a course in aviation will be required to pass the prescribed physical examinations before a Board of Army Surgeons.

"Applicants who pass the required physical tests and who are authorized by the War Department to attend the United States Signal Corps Aviation School, will receive the same pay and allowances, including those of travel to and from the school of instruction, as are received by the officers and enlisted men of the Regular Army of the same grade who are detailed on like duty."

This authorization to train National Guardsmen at Army Aviation Schools is given by Section 60 of the National Defense Act of June 3, 1916, which prescribes that organizations of the National Guard shall be the same as those of the Regular Army. Congress has provided an appropriation of $9,640,800 for the training of Guardsmen and organizing of twelve aero squadrons for the twelve Militia divisions.

Mr. Alan R. Hawley, President of the Aero Club of America, who has had extensive experience in connection with the movement to start aviation sections in the National Guard of different States, says that the National Guard has proven that it is the main source of supply for suitable men to build our air defenses.

"Congress," Mr. Hawley points out, "in 1914 authorized sixty officers for the Aviation Section of the Army. Two years later the Army had, nevertheless, only thirty aviators. Eight months ago the Aero Club of America called for National Guard volunteers to train in aviation and received about one thousand applications, which came from every State of the Union.

"There are at Mineola, L. I., at present close to one hundred Guardsmen from a dozen States being trained under the direction of the Army, under the supervision of Major Carl F. Hartmann, U. S. Signal Corps, and First Lieutenant Joseph E. Carberry, Military Aviator. Until the first week of August these Guardsmen were trained entirely at private expense. To-day the forty Guardsmen, comprising the number which are learning to fly (the others being in charge of other aeronautic work that does not require piloting an aeroplane) form a valuable reserve of prospective military aviators. Two of them, Captain James E. Miller and Lieutenant Alexander Blair Thaw, of the First Aero Company, N. Y. National Guard, already hold the Junior Military Aviator certificates. A dozen more have taken the International Aeronautic Federation certificate, which is what is known as the 'ticket' in England and the 'brevet' in France. Twenty-five others will soon be ready to fly for their certificate.

"Besides their flying training these Guardsmen have gained a practical knowledge of aeroplanes and motors which permits them to assemble and disassemble aeroplanes and motors without assistance. Whenever a new aeroplane is received the Guardsmen assemble it and put it in flying order without assistance. The fact that over two thousand flights have been made and so many men have been trained without a single accident shows how able they are.

"Captain Raynal C. Bolling, commanding officer of the First Aero Company of the New York National Guard, deserves much of the credit for the good showing made by that company. He is the officer who was put in charge of organizing the aero company by General O'Ryan on November 1, 1915, when the Aero Club of America contributed $12,000 to start the company. Captain Bolling received over two hundred applications from New York men who wished to join the company and out of the number he selected thirty men, practically all of whom have proven their qualification to make good aviators. Captain Bolling found it easier, in fact, to get suitable men to make aviation officers than men to make mechanics.

"The large number of applications from Guardsmen who wish to learn to fly sent to the Aero Club of America by the adjutants general of the States shows that the National Guardsmen can be relied upon to supply as many candidates for the air service as are needed.

"As Congress has provided for training of 1,000 aviators, and the Army is allowed only 114 aviators and the Aerial Reserve Corps only 297, including the technical officers, the National Guard will supply at least 589 aviators, who will be trained at Army aviation schools.

"About 3,000 non-commissioned officers and enlisted Guardsmen are also needed to make aviation mechanics, aviation engineers, etc., there being thirty-nine non-commissioned officers and enlisted men to one aero company with six officers. There are three companies to one aero squadron.

"Of course, the formation of aero companies and aero squadrons is to come only after the officers and enlisted men have been trained at the Army Aviation Schools and aeroplane and motor factories. They will be formed under the direction of the Army as provided for by the National Defense Act.

"The National Guard throughout the country will welcome General Mills' information. It has been awaited with great expectation. Until very recently those Guardsmen who applied for training at Army Aviation Schools were told that the Army could not undertake to train them."

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Robert Bacon, Who Encouraged Training of Harvard Men, is Candidate for Senate

HON. ROBERT BACON, ex-Ambassador to France, who co-operated with the Aero Club of America in encouraging the nineteen Harvard men to learn to fly is a candidate for the Senate, from New York.

He is an exceptional candidate, and while his lateness in entering the contest for the senatorship places him at a disadvantage, he stands a good chance of receiving the hearty support which he deserves.

Great Activity in Aviation

(*Editorial in Jamestown (N. Y.) Post*)

THIS is the first war in which aeroplanes have been used. After two years in actual service aircraft have become indispensable to the fighting forces. Without them modern artillery would be much less effective, for they adjust the fire to the long ranges. As scouts they bring information of troop movements which make surprise attacks difficult. That the American people have been aroused by the military operations of aeroplanes in Europe is shown by the action of Congress in appropriating $13,281,666 for aeronautics in the Army, National Guard and Aerial Reserve Corps. This was an increase of more than $12,000,000 over what the Secretary of War had asked for and the House Committee on Military Affairs had allowed.

The appropriation for aeronautics in the Navy were also increased by $1,500,000, making the total allowed $3,500,000. In all these matters the Aero Club of America has been influential. An Aerial Reserve Corps under the War Department has been authorized by the President. This will utilize volunteers for the air service and provides for the training of 296 officers and 2,000 men.

The first aero company of the National Guard of this State has been organized with funds raised under the direction of the Aero Club of America. It has been mustered into the Federal service with forty-five officers and men and four aeroplanes. The Second Company of the New York National Guard has been formed and is waiting to be mustered into the service. Aviation sections and aero companies have been and are being organized under the auspices of the Militia and aero clubs in a dozen States.

Aviators need much training before they become proficient. They need to be adapted both physically and mentally for the duties which they will be required to perform. Just as with the soldier and the sailor the country needs a reserve of aviators upon which it can draw in time of need. To be available these reserves must be trained. The Senate has approved the plan to use aeroplanes in the Coast Guard, the life-saving service and the revenue cutter service. While employed in these peaceful pursuits the men will acquire daily the skill and training which will be a valuable reserve to the Army and Navy.

Private efforts to supply trained civilians to make up the Army and Navy's deficiency in men have been undertaken in various places. One patriotic member of the Aero Club is paying for the training of a select group of men at Governor's Island. The school already has four aeroplanes. Still the work is only at its beginning. The military needs of Europe have placed other nations far in the lead in aviation, but with the funds provided and ambitious young men enthusiastic in the work it is expected that the United States will soon provide for its own needs in aeronautics.

Training Aviators

(*Editorial in Grand Rapids News*)

THE Aero Club of America is still engaged in creating an air force for the protection of the country in case of war.

The first steps to establish a complete unit of the Aerial Coast Patrol of New York were taken recently when a Curtiss flying boat was secured and several men from Yale reported at Port Washington, Long Island, of training. The equipment of the unit complete will be four aeroplanes and the necessary motor trucks and motor boats. The coast patrol system has been endorsed by President Wilson and the War and Navy Departments.

The first nine Harvard men to take up aviation to form an aerial reserve under the auspices of the Aero Club and the Harvard Undergraduate Aero Training Fund have reported to the Curtiss Aviation School at Buffalo for training. These men will be trained by Philip Rader, of San Francisco, who has just returned from Europe where he studied military aeronautics at the front. Mr. Rader has made over 2,000 flights in the last two years and never broken a wire. Due to his experience abroad he probably is better versed in military flying than any other aviator in this country.

One of the officers of the Aero Club says: "The club hopes to train 5,000 aviators. With this number in reserve we could very well be employed daily in peaceful pursuits, as this country would be in the position of the porcupine which goes about its daily peaceful pursuits and harms no one but is every ready to defend itself."

It is said the European war has proved that an aviator is worth an army corps. Whether or not this is true the Aero Club is doing its best to place the country in a position of safety and its efforts wil be felt when the danger comes.

Our Crippled Sea Flyers

(*Editorial in Providence, R. I., Journal*)

IT is learned from an official report that although the aeroplane ship North Carolina participated as a scout in the Atlantic fleet's recent war game, none of the hydroaeroplanes was regarded as safe to fly. It is further explained that the naval authorities are still seeking "the best type of pontoon," to minimize the danger of a water landing, and that "results may be expected soon."

The Navy, evidently, is even worse off than the Army in the aeroplane arm. It has been no secret of course that there are not enough machines and trained pilots, but it might have been supposed that those in service are serviceable. The disclosure is that the seaplanes are unfit for use at sea. The naval authorities are to be complimented on their prudence, however. Unlike the Army heads, they have not imperiled the lives of officers and men by requiring them to fly in ramshackle machines.

What is the difficulty about pontoons? And why should not the Navy's air fleet, "ship for ship," be as efficient as that of other navies? Not only is the aeroplane an American invention, but the first experiments with launching from the deck of a warship were made in our Navy. Now it appears our experts are struggling with details of construction.

It would seem at any rate that we could copy what has been achieved abroad if our own inventive faculties have become atrophied. Seaplanes have not figured much in the naval engagements in the North Sea, but one used by the British in the battle of Horn Reef demonstrated the preparedness of the machines, and of pilots and observers. At 2:45 o'clock in the afternoon Admiral Beatty signaled an order to one of his aeroplane ships to send up a plane for observation of the approaching enemy. Twenty minutes later the machine was under way, and by 3:30 the first reports had been received.

Congress has now provided a large appropriation for naval aeroplanes, and with the experience already available there is no reason why the service should not be made 100 per cent. efficient.

More Big German Aircraft

(*Editorial in Indianapolis Star*)

BRITISH accounts of the damage done by Zeppelins in their raids on the English coast cannot be accepted as the complete truth, for they are undoubtedly censored, but there is strong basis for the belief that they have not rendered the service expected of them and have disappointed German hopes.

But the French War Office has information that the Germans have been turning their attention to developing enormous aeroplanes, though these have not yet appeared on the battlefield. Some of them are for sea service—hydroaeroplanes of exceptional power. One of these is seventy-five feet across, with four motors and able to carry six passengers. Another, 137 feet across, with three motors of 200 horsepower each, is said to have been constructed at Friedrichshaven and to have flown over Lake Constance.

Aircraft of great power for service on the land front are two-motored aeroplanes. One is of the "Aviatik" type, seventy-eight feet across. It is steered by three rudders. It has places for an observer or a gunner and a machine gun behind the pilot and for another gunfirer on the balcony before the pilot. The other type is of similar model, but more rapid in flight. The motors in these aeroplanes are of 220 horsepower.

If these enormous flying machines prove effective they are likely to be heard from frequently later in the war. And if they are shown to be manageable and practical, they will mark a long advance in the development of the aeroplane. Heretofore the French have manifested the greatest ingenuity in the improvement of flying craft since the Wright brothers mastered the great secret of aerial navigation, but it seems that the Germans have not been idle. By the time the war is over airships are likely to have proved their usefulness for many kinds of service besides the carrying of guns.

THE NEWS OF THE WEEK

John Hays Hammond Testing Wireless Torpedo

Sixteen men from the Coast Artillery are assisting John Hays Hammond, Jr., in his experiments with a wireless-controlled torpedo at Gloucester, Mass. The men are putting up control stations and building a floating hangar for the flying boat expected this week.

Mr. Hammond will demonstrate his invention before a joint Army and Navy board this fall, as demanded by Congress. A motor boat capable of thirty miles an hour will be controlled by wireless from the aeroplane.

The Sperry Searchlight

Since publishing the article on the Sperry Searchlight in our issue of September 4, we have learned several items of interest in addition to those which appeared. The lamp on the latest searchlight when equipped with a 36-inch mirror gives a beam of 1,280,000,000 candlepowetr. In a demonstration which was recently made with a 60-inch Sperry light on the roof of the Sperry Building, in Brooklyn, the beam was powerful enough to be seen overhead sixty-four miles away. When turned on New York's skyscrapers it gave light enough to enable a number of cameramen to take motion pictures of the buildings.

Heinrich's Twin-Motored Battleplane Climbs to 7,200 Feet

Mr. Albert S. Heinrich on September 10th flew the twin-motored battleplane of the Atlantic Aircraft Company to a height of 7,200 feet with Lieut. Lorbert Carolin, New York National Guard.

The machine which is equipped with two 90 h. p. Aeromarine motors, flew easily and showed perfect stability.

Eden Makes 150 Miles in Two Hours

Frederick C. G. Eden, of London, using the flying boat of W. Earl Dodge, of Newport, and New York, flew from City Island, R. I., to the aviation camp of Mr. Dodge at the south end of the harbor at Newport, covering over 150 miles in two hours. Machinist Chester Swift accompanied Mr. Eden, who departed at 2:20 this afternoon and was on the landing at 4:20. The wind was at times fresh from the southwest, which was more or less against the machine.

Interocean Aeroplane Co. Acquire Land at Plainfield

The Interocean Aeroplane Co., Inc., of 27 William Street, Manhattan, owners of the "Circular-Planescope," has acquired fifty acres of land near Plainfield, N. J., from the Rosalind Realty Co., of New York. The land, which is beautiful level plains, is situated only 23 miles from New York and on the Lehigh Valley Railroad, and will be used by the aeroplane company for its factory and aviation field, which is named Columbia Plains, in honor of Columbia University. One of the directors of the company is a Columbia man and the Interocean people will extend the privileges of Columbia Plains to an Aero Corps that students at the Morningside Heights institution intend to organize on lines similar to the ones now existing at Cornell, Harvard, Yale and other eastern universities. The company also has an option on other land adjourning Columbia Plains. The Interocean Aeroplane Co. has just been incorporated under the laws of the State of New York for $100,000, and will manufacture the "Circular-Planescope." It is designed on the lines of a mechanical parachute, balanced by the lower center of gravity and the construction is of metal steel and aluminum.

Proposed Consolidation of Automotive Engineering Societies

The members of the American Society of Aeronautic Engineers have voted practically unanimously to consolidate with the Society of Automobile Engineers, which is soon to change its name to Society of Automotive Engineers. Over thirty members of the former society have already applied individually for membership in the S. A. E. This action has been taken in order that there shall be as little delay as possible in advancing the aeronautic engineering work in all its phases.

As has been announced in the *Bulletin,* the Standards Committee of this society is immediately available for purposes of aeronautical work. The newly formed Aeronautic Engine Division is now busily engaged in the consideration of standardization problems.

The Board of Directors of the A. S. A. E. in referring to the report made by its committee appointed to discuss with the S. A. E. council the advisability of consolidating the two societies has expressed itself as follows:

"The broad-minded, far-seeing manner in which the Society of Automobile Engineers has considered and acted on the proposal to form a general alliance of the organizations interested in fields concerned with the development and utilization of the internal combustion engine, is emphatically indicative of the new American spirit.

"This proposed concentration of engineering effort upon the problems of the aircraft art cannot fail to insure the most energetic development of its important and rapidly growing industry.

"That an organization which has already done so much for the country, and in fact, the world, as well as for its own members, should take steps voluntarily to change its name and share its prestige with comparatively new organizations is a remarkable exhibition of idealism and deserving of broader fields of usefulness and still greater achievement.

"The Society of Aeronautic Engineers desires to express its admiration and appreciation, and in addition, its hope that it may be able to do its share in the broader movement which through your co-operation is now under way."

Aviation Papers to be Read at S. A. E. Mid-Winter Meeting

The annual mid-winter meeting of the S. A. E. will be held during the week of the New York Automobile Show. One afternoon will probably be given over largely to consideration of aviation subjects. It is also planned that there

The U. S. Army aerodrome at Mineola, Long Island, photographed from the M. P. F. battleplane.

shall be at least two important papers on aeronautics, to be followed by three fifteen-minute discussions of important aviation subjects.

Major Campbell, British Officer, Hurt in Fall

Major W. C. Campbell, a British army officer, and Theodore De Kruipss, a Harvard University student, were seriously injured by the fall of an aeroplane at the Curtiss Aviation. School. The machine fell about 500 feet.

The injured men were taken to the Erie County Hospital. Major Campbell's condition is regarded as critical. His skull was factured and several ribs were broken.

Bureau of Standards Co-operating with Aeroplane Manufacturers

Aeronautical manufacturers throughout the country will be glad to learn that the Bureau of Standards in Washington, of which Dr. S. W. Stratton is the efficient director, is glad to co-operate in every way possible in tests of materials.

The Bureau is making a great many tests of materials used in aeronautical construction. The general information gained is gladly placed at the disposal of manufacturers.

In regard to specific tests the Bureau's policy is not to interfere with the work of commercial testing laboratories. However, in view of the fact that such laboratories are not equipped to make tests of most aeroplane materials, the Bureau is pleased to undertake to make them to a limited extent in cases where local facilities are not available. Of course, this refers to the ordinary tension and compressoin tests of materials. This whole subject is in the development stage, and it will probably be some time before the Bureau feels sufficiently prepared to publish much on the subject. However, if the manufacturers and others concerned will make inquiries as to specific materials required for a definite purpose, the Bureau will be pleased to give them such information as it may have at hand.

First Government Built Hydroaeroplane Flies at Washington Navy Yard

The first hydroaeroplane built by the Government made its initial flight at the Washington Navy Yard a few days ago, with Naval Constructor H. C. Richardson, designer, as passenger and Lieutenant C. K. Bronson as pilot.

The preliminary flight of a hundred feet or so in the air over a period of three-quarters of an hour, gave most satisfactory results; several minor changes, of which one is a change from a shoulder to a foot control will be made, and another flight will be made soon.

The machine is a biplane, with triple floats, triple bladed propellers, and is equipped with two VX Curtiss Twin Motors, of 160 h.p. each, developing a speed of from forty to fifty miles at getaway to an eighty-mile maximum speed in the air: R. A. F. Six wing section with 59-foot top and bottom wingspread, length 38 ft., height 17 ft., built on narrow lines with 1,000-foot surface to the 59-foot span. Raising approximately 400 feet per minute.

The load carried on the trial trip was approximately 1,200 lbs., although fully equipped with rapid-fire gun and ammunition, and radio outfit; 2,000 pounds of dead weight were designed for.

The machine was designed to carry in addition to the gun, ammunition, radio, etc., from two to three passengers, depending on balance.

Many new features are incorporated, but none of a radical nature, except the triple float, three-bladed propellers and balanced flippers or diving rudders. The balanced rudders produced excellent results, responding quickly to control.

The speed indicator used is a special design of the Navy. The design for the hydroaeroplane was started over a year ago, active work having been commenced last November.

Carter Bros. Co. Close Contract with South American Company

The Carter Brothers Aeroplane Company of Hysttsville, Md., has closed a contract with a company in South America for the exclusive manufacture and sale of the Carter Double Engine Aeroplanes and Seaplanes under the Carter Patents.

This contract which runs for a number of years, calls for a minimum output of 20 aircraft a year on a royalty basis.

Aeroplanes in Flight Communicate by Radio

What is said to be an important advance in the field of aeronautical radio-telegraphy was achieved at San Diego September 2nd, when a wireless message was sent from one aeroplane in flight to another.

Captain C. C. Culver, in an army machine, piloted by Lieutenant Herbert Dargue, received the message which was transmitted several miles by Lieutenant W. A. Robertson, who was in another machine guided by A. D. Smith. The message, which read, "National aviation field sets new world's records," was received distinctly by Captain Culver.

According to Captain Culver, this is the first time on record in this country, and perhaps in the world, that a wireless message has been received by one aeroplane from another while both machines were in flight.

Two Thousand Flights with But One Accident

Notwithstanding the fact that since the opening of the aviation school at Governor's Island over two thousand flights have been made, the first accident occurred on September 7th.

J. Walter Struthers, of New York, and Charles D. Wiman, of Moline, Ill., were spiraling in a biplane at an altitude of 800 feet above the aviation field on the island when the machine developed tail spinning and dropped to the ground before the aviators were able to regain control of it.

Struthers and Wiman were strapped to their seats under the wreckage of the biplane, and it was nearly fifteen minutes before the soldiers and mechanics on the field could get them free from the tangled wires and convey them to the post hospital.

Surgeon Lieut. R. Goodman found that both of Struthers' legs had been broken and that he had sustained internal injuries, while Wiman had a fracture of the thigh. Both aviators were unconscious when picked up. Wiman was the

The popular and novel aeronautic library at the North Atlantic Aeronautic Station at Newport News, Va., which comprises an excellent selection of works on aeronautics.

first to revive. Struthers, the more seriously injured, will recover, Surgeon Goodman says, unless unforeseen complications develop internally.

An examination by aviation experts at the island showed that the pilots had kept their heads, and, at the last moment, had done everything possible to avert the accident, even the switch having been thrown open to avoid risk of the machine catching fire when it struck the ground.

A committee was formed, consisting of Colonel J. B. Bellinger, Major Carl F. Haltmann and Captain C. G. Kilbourne, all of General Wood's staff, to investigate the accident. The officers said they would wait until Struthers and Wiman were able to answer questions.

Aerial Coast Patrol Unit Co-operates with "Mosquito" Fleet

The students at the station of the first unit of the Aerial Coast Patrol at Fort Washington, Long Island, co-operated with the "Mosquito" fleet of fast power boats that engaged in a week's maneuvers to work out the tactical problem of the defense of New York harbor, and the naval experts who watched the maneuvers vouch that the success of the fleet in locating and destroying the enemy was due to their reconnaissance work.

Several thrilling incidents were associated with the scouting work, which was chiefly done by Frederick T. Davison, Robert A. Lovett and David H. McCullough, the instructor at the Aerial Coast Patrol unit.

In the midst of the violent storm, September 8, while the wind lashed the waters of the bay into high "rollers," this flying boat, driven by Frederick Trubee Davison and David H. CcCullough, started out early in the afternoon under orders to discover an enemy fleet, the two torpedo boat destroyers Flusser and Warrington, which were approaching New York.

Notwithstanding the weather conditions, which sent their mother ship, the little power boat Dodger II, back to sheltered water, the two men kept on, sighted the "enemy," and then descended at Oak Island, fifty miles from their base in Gravesend Bay. Here they telephoned back the location of the enemy ships in time to have the news transmitted to the battleship fleet in the harbor, thus causing the destruction, theoretically, of the enemy.

The play of coast defense by fast flying airboats has been worked out chiefly under the direction of E. S. Willard, and this was the first time that it had been tested.

Early in the morning the torpedo boat destroyers Flusser and Warrington slipped out of the harbor and ran about sixty miles down the coast. They then turned and prepared to came back in the guise of a hostile squadron. The Flusser was to be the advance and was to conceal the Warrington, the "main fleet," by its smoke screen. The flying boats with their mothership were to sight the "enemy" and signal to their mother ship the exact time of sighting. The "enemy" commanders plotted their course so as to check up the report of the observers.

As the boats raced down the bay, the power boat burrowing her nose in the waves and shaking off the spray as though she were at play, and the aeroplane soaring like a great bird far above her, there came the distant mutter of thunder. The sky began to cloud over until it was almost dark, and vivid flashes of lightning lit up the hydroaeroplane.

The wind now began to rise and the waves began to pile over each other so as to endanger the small Dodger II, scurrying along, now in the hollows and now riding the waves toward the sky.

The airboat mounted until it was lost to sight, and those on the Dodger thought that the aviators had been forced to give up the flight. As the Dodger had already gone out to accompany the flying boat, her commander felt she should turn back. When she got back to the Atlantic Yacht Club and those on her found that the hydroaeroplane had not returned, she hurried right out to sea again to search for it. Also, the New Jersey, flagship of the squadron of big ships present at the mosquito maneuvers, was notified and sent a wireless message to the destroyers to hurry up and help hunt for the lost hydroaeroplane.

But Davison and McCullough were not lost. When it grew dark and the rain came they mounted aloft until they disappeared in the clouds. The wind bothered them, for the squalls rocked their tiny craft and threatened to overturn them into the ocean far below. But they had come out to sight the enemy, and they would not land or turn back until that enemy was sighted.

The rest of the story was told in a message which the Atlantic Yacht Club received when the members had become greatly alarmed over the continued absence of Davison and McCullough. From Edward S. Warner, a life guard at Quogue, came the report that two men had telephoned him from Oak Island, asking him to tell the club to signal the warships anchored there that the enemy had been sighted at 3:41 in the afternoon.

The aviators had been forced to land at Oak Island on account of the weather, they told Warner to say, but before any landing was made both destroyers had been seen at Fire Island.

The flight had been made in less than fifty minutes in the teeth of one of the most severe storms that had visited the coast this summer. Captain L. A. Kaiser, commanding the battleship fleet, wigwagged back "Well done" when the news was conveyed to him.

War Promotes Aviation

One of the most graphic demonstrations of the influence of the war on aviation is provided by the list of aviators granted the Royal Aero Club certificate. The first R. A. C. certificate was given March 3, 1910, to J. T. C. Moore-Brabazon, and up to July 30, 1914, 861 had been issued in all. By January 9th last the number had risen to 2,253.

The Aviation Section of the Michigan National Guard. H. W. Blakely, instructor, is standing second from the right. The machine is the product of the L. W. F. Engineering Co. of College Point.

AVIATION DAY AT THE CHICAGO ADVERTISING ASSOCIATION

WE have just received a copy of *Chicago Advertising,* the official organ of the Advertising Association of Chicago, which gives such an interesting account of the recent Aviation Day at that club, that we reproduce it herewith in full.

"Aviation Day was the biggest day in the history of the Advertising Association of Chicago. We proved our right to the title "the livest club in Chicago." The dining room was over-crowded, 61 more people were fed than ever before (261 total). Two hundred stood around and listened and 200 more could not get in. Never before was such an interesting meeting staged at the club. The air was full of patriotic feeling, many of those present believing that we are on the steps of a new commercial and military era, the conquest of the air for America seemed within our grasp.

The meeting was held in connection with the Aero Club of Illinois and was the culmination of a previous meeting of the Aero Club, where President Dickinson asked Glenn Muffly and Hank Reid if the Advertising Association of Chicago would help the Aero Club of Illinois to get the Ashburn Field selected by the government as a central mobilization point. Then there was a get-together meeting between President Clough, who appointed **Glenn Muffly and Hank** Reid as the club's aviation committee with President Dickinson and Manager J. S. Stephens of the Aero Club of Illinois. August 15 was decided on as the get-together day for the two clubs.

The club's committee, assisted by the Aero Club, got up the most ambitious program attempted and carried it through to a successful finish. The announcement and the menu were both unique.

Glenn Muffly was the chairman of the meeting and carried it through gracefully. Some of the speakers took sly raps at the outline he had furnished, although if they had stuck to the text the meeting would have proceeded more rapidly.

President Clough opened the meeting at 1 P. M. sharp with most commendable promptness and introduced the chairman.

President Clough welcomed the visitors, spoke of the great possibilities of aviation and reminded his hearers that Mr. Muffly had designed the first revolving aeroplane motor ever made—this before the Wright brothers flew. He reminded his hearers that aeroplane inventors' dreams had come true and hinted that an air transportation system, as a common carrier, between Chicago and Detroit, Chicago and New York and other points might be another dream of the chairman soon to become a reality. It was fitting that advertising and aviation, the oldest and the newest arts, should be linked together. The meeting was then turned over to Mr. Muffly, the chairman.

The chairman introduced Charles Dickinson, the president of the Aero Club of Illinois, who discussed the big problems facing us as a nation today. He told of the Ashburn flying field, the only square mile in Chicago without a tree or building on it, of the patriotic work of the club, working against suspicion and superstition. Two of the greatest flying events in the world had been fathered by his club, but the public were asleep. The war in Europe had forced us, against our will perhaps, to wake up and realize we were on the edge of a seething crater, rather than in security and sloth. It is hoped that the government will take advantage of the offer of the Aero Club of the field, of the 120 willing recruits, by detailing the necessary aviation officers and use the field and Chicago as a central mobilization camp.

Bion J. Arnold, the traction expert and chairman of the Transportation Committee of the Naval Consulting Board, spoke of the great and vital necessity of a large aerial fleet. He agreed with Glenn Muffly that the biggest problem in modern warfare was keeping roads in condition and protecting the line of communication. He believed that it was practical to transport an army with aeroplanes; said that aeroplanes capable of carrying 5 tons were now in use in Europe and that planes carrying from 15 to 20 men were being used. He believed that 15 would be nearer the number to be carried than 20, but at that ratio 10,000 aeroplanes would carry 150,000 men. According to Mr. Arnold, President Wilson, the army and navy officers and the civilian experts on the consulting board were working together happily with practical result, and he believed that Chicago was a logical point for an aviation field.

By great good luck we had the good fortune to have Captain Joseph C. Morrow with us, of the aviation division of the army. He said he was pleased at the red hot enthusiasm displayed, glad to be here, and told many interesting things about aviation. Men of Captain Morrow's type are a credit to their country; it is hoped that he will stay here. and that President Wilson will accept Chicago and Ashburn Field for the government.

Hank Reid presented a resolution asking that Ashburn flying field be accepted. Mr. Kier seconded the motion, which was adopted amid great applause and wild cheers. The resolution was telegraphed to President Wilson, Secretary Daniels, Secretary Baker and Col. Squier. The resolution follows:

Resolved, That it is the sense of this meeting that a large number of men should be thoroughly trained as aviators for the United States army and navy within the shortest possible time.

That we favor the establishment by the United States Government of an aerial training and mobilization station at the Ashburn Flying Field, Chicago, which has been offered for the free use of the Government by The Aero Club of Illinois.

And, that copies of this resolution be forwarded to President Wilson, the Secretary of War, the Secretary of the Navy and the chief of the Aviation Dept. U. S. Army.

Advertising Association of Chicago.

Commandant Moffett of the Naval Training Station sent a letter to President Clough which was read, regretting his necessary absence and telling of the fact that some aviation training was hoped for at Lake Bluff.

SPECIAL MENU FOR AVIATION DAY

Vilas Pirate Soup
Choice of
Gyroscopic Shrimps
Feathered Monoplane a la King
Hoi Polloi Hot Beef, roasted
Barograph Beef, 32° F.
Hangar Ham Salad a la Spud
Dickinson's Peas
Boiled Potatoes a la Fuselage
Publicity Potatoes, pulverized

Brock Buns and Busian Butter

McCutcheon Ice Peach Pie a la Stout
Arnold Apple Pie or Coffin's Cherry Tart

Clough Coffee, Tractor Tea, Altitude Tea with
Ice or Extract of Milky Way

Walter Brock, a Chicago boy, who won the last London to Paris and return race and also the last three big races abroad just before the war, was the next speaker. He told how he flew from London to Paris and back in 7 hours, although the express time for the round trip is 32 hours. Flying is an every-day matter to Mr. Brock; he thinks it much safer than motoring and much more delightful. If your motor stops in the air you have a big area to glide down safely, while if your auto hits a tree it's all off. Up in the air there are no obstructions to free travel—no skidding, no drunken joy riders, just a safe and sane place with no dust and lots of sunlight and fresh air for a practical man. His modest and practical talk was much enjoyed.

Katherine Stinson did not quite agree with Hank Reid's menu, but otherwise thought that everything was delightful. She said Chicago could do anything; it was the most progressive and best place on earth, therefore if the government had brains Ashburn Field would be selected.

This little 17-year-old Chicago girl is the most noted and daring woman aviator in the world and loops the loop and does other stunts much easier than she makes a speech. If half the men in Chicago had 100,000th of the pluck of this girl we would have an aviation corps that would keep the world at bay.

Her famous sister flier, Majorie Stinson, said one speech in one family was enough, but was glad to be here and hoped lots of other Chicago girls would learn to fly.

It was impossible for Billy Stout to be present and Howard E. Coffin, chairman of the Industrial Preparedness Commission, expected to come up to the last moment, but sent a wire expressing his approval of the meeting and its object, and believed that we should wake up and realize that Europe

(*Continued on page* 25)

SYMPOSIUM OF OPINIONS ON PROPELLER TESTS

Standards Should be Divided in Classes

By Donald W. Douglas

Dear Sir: Replying to your favor of the 4th inst., beg to state that I have heard much talk about the inadequacy of the wooden propeller of standard construction to withstand the climatic conditions found in Mexico.

On thinking this matter over, and giving consideration to what has been done before with aeroplanes in climates that are more severe than that of the border, I am inclined to believe that the greater part of the trouble cannot be laid at the door of the climate, but must be attributed to the following points:

Propellers not properly designed;
Propellers not properly balanced;
Propellers out of true in pitch;
Wood not seasoned properly;
Faulty design of motor hub and flanges;
Fluttering tendency of blades when backed up by radiators which are not symmetrical above and below the propeller axis;
Bad vibration transmitted from motor, by either the fault of the motor itself, or the method of mounting it.

You also ask whether we can now adopt a standard propeller. Emphatically, we can never adopt a standard propeller for even the same machine and same motor for we might wish to employ this same machine for different purposes. Long distance flights, great climbs and high speed, if desired to the exclusion of other qualities, require different blades. I imagine by your inquiry you rather wish to know my views on the advisability of adopting a standard propeller hub. I am advised by the Standards Committee of the S. A. E., that they contemplate using the French Standard for propeller hubs for all motors up to 250 H. P. I am very strongly set against any such move as this—if the hub is adequate to transmit 250 H P., the excess weight when used on an 80 H. P. motor will be very large. There would never be an occasion for removing the blade of a 250 H. P. motor and placing it on that of an 80 H P., or even for placing it on a 200 H. P. motor. What possible advantage then can result from this single standard? If a standard is to be adopted, then I believe it should be divided into classes. We might then have standard hubs for motors of from 250 to 200 H. P., 200 to 150, and from 150 down. Such a standardization of hubs would be a boon to manufacturers and not a bug-bear.

Yours very truly,
Glenn L. Martin Company,
Donald W. Douglas, Chief Engineer.

Checking of Wood to Blame

By A. R. Knabenshue

In answer to your inquiry of August 4th conerning propellers at the Mexican border:

It is my understanding that the present difficulty is due to checking of the wood, and this is undoubtedly caused by the heat and lack of humidity.

I believe that propellers encased in linen glued firmly to the surface, and this in turn rubbed down and varnished to give it a high finish would assist to preserve the natural moisture of the wood.

I remember in the winter of 1910, at the aviation meet in Los Angeles, Hubert Latham had several propellers constructed along these lines. A covering of burlap or canvas during the period when the machine is not in use would assist in preventing checking also.

In reference to standardizing propellers: I believe that you will agree with me that different types of propellers are required for individual motors and aeroplanes in order to secure the greatest efficiency.

Trusting this information meets with your requirements, I beg to remain,

Very truly yours,
The Wright Co.
A. R. Knabenshue.

Time Ripe for Standardization

By Spencer Heath

Dear Sir: Replying to your letter of August 4th, asking my opinion as to the best type of propeller to use on high-powered machines under climatic conditions of great heat, I would say that I consider the problem presented in such case as one of degree only. By this I mean that under the conditions stated, practically all of the points to be observed in propeller design and construction should be attended to with greater thoroughness and care and larger factors of safety should be employed throughout. Our best information and official reports make it appear that a hot and arid atmosphere has no appreciable effect upon the glue used in wooden propellers but only upon the wood itself. It appears that under the dry conditions the wood becomes much more brittle and also has a somewhat greater tendency to warp. In my opinion and according to my experience the correct and suitable way to meet these conditions is by increasing the width and thickness of hubs and adjacent portions and increasing the thickness of blades. As regards the tendency to warp, it appears that this can be obviated to all practical purposes by using thoroughly seasoned wood and by so selecting the wood for each blade so that it will present what is known as "edge grain" on both sides of the propeller blade. The problem in regard to strength, therefore, is simply one of increasing the factor of safety throughout sufficiently to compensate for the deteriorating effect of climate upon the wood.

Your inquiry in regard to adopting a standard propeller, I take it, must refer to standardizing the hub of the propeller for interchangeable attachment on different kinds of makes of aeroplane engines. I do believe that the time has arrived for adopting standards for dimensions of wooden propeller hubs. This refers to the axial length of the hub, the diameter of hub face, the size of center hole, and the number, diameter and spacing of the holes for the bolt circle. With these dimensions standardized propellers could be finished in advance completely ready for attachment to the hub fittings of any aeroplane motor, and it would be as possible and convenient as it would be desirable to use the same propeller first upon one engine and then upon another without alteration of any kind. The varying sizes of aeroplane engines could be provided for by having at least two or not more than three sets of standard hub dimensions, as for example, standard dimensions for engines up to and including 100 H. P.; a second set of standard dimensions for engines of more than 100 H. P. and not more than 200 H. P.; and a third set of dimensions for engines of more than 200 H. P. In this way any propeller used in connection with any engine will be interchangeable with any other propeller used on an engine of the same class in regard to power.

My above suggestion, as to standardizing wooden hubs of propellers, I believe can be carried out in the immediate future without serious difficulty or delay. Somewhat later it will be possible to standardize the steel propeller hub fittings so that the hub fittings themselves will be interchangeable on different motors. This is a thing much to be desired and which should be constantly looked forward to, but by its very nature it must, for the immediate future, be deferred at least until eminently satisfactory designs for hub fittings have been produced and engine manufacturers brought into agreement upon a matter as to which there is now much variance. The matter of propeller hub standardization, however, presents far less difficulty. I believe engine manufacturers could come to an agreement in a very short time as to satisfactory dimensions for the wooden hubs.

Concluding, then, I should say the time is ripe for standardizing the wooden hubs and those portions of the metal fittings to which the wooden propeller is directly attached, and that this standardization can be accomplished very soon and very much sooner than the standardization of engine shaft ends and the portions of the metal hub fittings which are fitted and secured directly to the engine shaft or to the drive shaft of the propeller as the case may be.

Very truly yours,
American Propeller Company,
Spencer Heath.

Standardization in the Future

By B. C. Scott

Gentlemen: Answering your favor August 4th: Wish to advise that it would not be policy for us to give you information concerning type of propeller which we believe would be most suitable for use under service conditions in Mexico, in view of the fact that we now have a number of propellers on order from the U. S. Government, which are of our own peculiar design, something which has never before been attempted. We believe these propellers will stand up and give satisfaction under almost any climatic conditions. We consider this propeller design our own, and would not want to make it public.

We do not believe there is any possibility of standardizing on propellers at the present time. No one seems to know, and no data can be obtained in regard to proper shaping of

(*Continued on page* 25)

REGULATIONS GOVERNING ORGANIZATION OF THE AERO COMPANIES OF THE NATIONAL GUARD

ON September 8th the officer in charge of the Aviation Section transmitted to the Aero Club of America a copy of circular No. 9, dated August 11th, and issued by the Militia Bureau of the War Department, giving the regulations governing the organization of Aero Companies. The entire contents of circular No. 9 are reproduced herewith.

WAR DEPARTMENT,
MILITIA BUREAU,
Washington, August 11, 1916.

The following regulations governing the organization of aero companies of the National Guard, having received the approval of the Secretary of War, are published for the information and guidance of all concerned:

1. An aero company is the smallest recognized administrative unit. It consists of 6 officers as aviators and 39 enlisted men.

The personnel of an aero company as laid down in Tables of Organization, United States Army, 1914, as amended by Changes No. 6, is as follows:

1	captain.
5	first lieutenants.
1	master signal electrician.
2	first-class sergeants.
5	sergeants.
9	corporals.
2	cooks.
14	first-class privates.
6	privates.
—	
45	total.

Of this enlisted personnel, 12 mechanicians are necessary—6 to care for and overhaul motors and 6 to care for and make repairs on planes.

Applicants for these positions will be examined both theoretically and practically.

Examinations will be as follows:

MOTOR MECHANICIAN.

Aeronautical motors.—Theory of internal combustion engines; practical examination on installation, operation, repair, disassembling, and reassembling; carburetor adjustment; magnetos.

AEROPLANE MECHANICIAN.

Aeroplanes.—Ability to make wire fittings, using both cable and hard wire; soldering, materials; assembling; disassembling; alignment; correcting faults in lateral and longitudinal balance; and such other work as is necessary in the ordinary repair and upkeep of aeroplanes.

2. Applications from States to form aero companies will be favorably considered, and probationary recognition will be granted for a period of one year from the date of their inspection by an officer of the United States Army, provided the personnel of the unit presented for inspection conforms to the standard of the Regular Army; if at least 4 of the 6 officers of the organization are licensed aero pilots and 12 of the enlisted men are qualified as mechanicians as noted above; provided there is available for use of the company a suitable flying field and at least one serviceable flying machine.

To such organizations, gasoline, oil, etc., necessary for the official flights of aircraft for training the aviators of the company will be furnished from Federal funds, under the following conditions:

(*a*) For aircraft owned by the State.

(*b*) For aircraft presented to the National Guard.

(*c*) For privately owned aircraft which has been donated to a State or loaned temporarily to it, under conditions whereby the proper State authorities will have the power to control and regulate flights taken by members of the recognized company.

3. At a date not later than one year from the date of probationary recognition, another inspection will be made by an officer of the Aviation Section of the Signal Corps of the Army for the purpose of determining if recognition shall be continued and the United States aero equipment issued.

Continued recognition as a unit of the National Guard and the issue of the United States equipment from funds appropriated for the purpose will be made contingent upon the following conditions, the existence of which will be determined at the second inspection:

(*a*) *Organizational requirements.*—Personnel of the organization to comply with Tables of Organization, United States Army.

(*b*) *Professional and physical requirements of aviators.*—They must pass the prescribed physical examination before a board of Army surgeons, required for entrance into the Aviation Section, Signal Corps, United States Army. If they have completed a course of instruction at an Army Aviation School satisfactorily they will be exempt from the technical examination. Those who have not completed a school course will be given a technical examination which will be both theoretical and practical, as follows:

FLYING.

(1) Five figure 8's around pylons keeping all parts of machine inside circle whose radius is 300 feet.

(2) Climb out of a rectangular field 1,200 feet by 1,200 feet and attain an altitude of 500 feet, keeping all parts of the machine inside rectangle during flight.

(3) Climb 3,000 feet, cut off motor, spiral down, changing direction of spiral—that is, from left to right and right to left—and land within 150 feet of previously designated mark.

(4) Land with dead motor in a field 800 feet by 100 feet, assuming said field to be surrounded by a 10-foot obstacle.

(5) From 500 feet altitude land within 100 feet of previously designated point with dead motor.

(6) Cross country triangular flight without landing of approximately 60 miles.

(7) Straightaway cross-country flight without landing of at least 90 miles.

AEROPLANES.

Ability to make wire fittings, using both cable and barb wire; soldering, materials; assembling; disassembling; alignment; correcting faults in lateral and longitudinal balance; and such other work required to show that applicant is thoroughly qualified to superintend all repairs and to care for his aeroplane.

AERONAUTICAL MOTORS.

Theory of internal-combustion engines; practical examination of installation, operation, repair, disassembling and reassembling; carburetor adjustment; magnetos.

METEOROLOGY.

Air conditions; pressure and temperature effects on flying; weather maps; wings; clouds.

NAVIGATION OF THE AIR.

The magnetic compass; its deviations; errors and adjustments. Steering by compass; by map; drift; bearings; landmarks; effects of terrain upon air conditions.

(*c*) *Provisions for training of personnel and care and maintenance of material:*

FIELD.

Minimum acreage: 300 acres.

Site: Clear, open, level, free from obstructions and well drained at all seasons.

Shape: Generally rectangular or elliptical boundary with no reentrant angles and not surrounded by high obstacles.

Access: Field should be readily accessible at all seasons.

BUILDINGS.

All buildings at the aerodrome should be substantially built of good material, be weather proof, well lighted, and dry, affording good storage for materials contained, aedquate provisions for the safekeeping of the material and protection against fire. There should be a caretaker or watchman on the premises all the time.

Hangars.—All hangars should be of ample size for the machine to be housed therein, with sufficient room to permit of the assembling and repairing for the machines in the hangars. There should be ample door clearance for the machines to be housed. All hangars should be on the edge of the flying field, so machines can be flown from their proximity.

Repair shops.—Ample floor space and equipment should be provided for the repairing and overhauling of motors and aeroplanes, and equipped with motor-driven lathes, shaper, and drill press.

Storage.—Proper and complete storage facilities should be provided for all spare equipment.

Proper and ample facilities should be provided for the safekeeping of all records, files, etc., pertaining to the equipment furnished. Proper provision for keeping up all office records should be furnished.

4. PHYSICAL EXAMINATION OF AVIATORS.

Place..............................
Date.........................
Name ....
Rank and organization.................................

EYE.

1. History of previous eye trouble..............................
2. Ocular movements.......................................
3. Pupillary reaction:
    Right ....
    Left ....
4. Muscle balance at 20 feet..................................
5. Any visible lesion of eyes:
    Right ....
    Left ....
6. Is ocular nystagmus present?................................
    Does ocular nystagmus occur when eyes turn easily to one side?....
    Does ocular nystagmus occur when eyes are turned to extreme side? ....
7. Field of vision:
    Right ....
    Left ....
8. Vision:
    Visual acuity: Right ....
    Left ....
    Near point: Right..............................C. M.
    Left..............................C. M.
9. Refraction under 2 per cent homatropine:
    R........... S = ... C. ax = ...
    L........... S = ... C. ax = ...
    Ophthalmoscopic examination:
    Right ....
    Left ....

EAR.

10. History of ear trouble:
    Ever have earache?..................................
    Ever have discharge from ear?............................
    Ever have mastoiditis?...............................
    Ever have ringing or buzzing in ear?.......................
    Do you have attacks of dizziness?.........................
    Are you dizzy when swinging?............................
    Are you dizzy when at great heights?......................
    Have you been seasick?...............................
    How long does seasickness last?.........................
    Do you always have an attack of seasickness during sea voyage? ....
    Do you suffer from headaches?...........................
    Have you ever had severe head injury?.....................

NASOPHARYNX.

11. Tonsils ....
12. Adenoids ....
13. Are eustachian tubes fatulous?............................
14. Is nasal septum deviated?................................
    To which side.................. Degree.................
    Is either nostril obstructed?..........................
    Which side .... Cause.................
15. Hearing:
    Whisper: Right...... Left......
    Ordinary low voice: Right...... Left......
    Watch: Right...... Left......
    Appearance external canal: Right...... Left......
    Appearance membrani tympani: Right...... Left......

STATE TESTS, HORIZONTAL PLANE, SHOES REMOVED.

	Eyes opened.	Eyes closed.
16. Applicant to stand knees pressed back, arms loose by sides of body, inner margins of feet touching each other	......	......
17. Applicant to rise from above position on toes and stand	......	......
18. Applicant to stand flat on right foot—may rest left foot on right knee or instep	......	......
19. Left foot, as above	......	......

NOTE.—Record in proper space above as *firm* or marked swaying.

EQUILIBRIUM (VESTIBULAR).

Caloric nystagmus.

20. Cold water: Right ear, amount used........................c. c.
Water temperature.........°C. Direction of nystagmus.........
(Head backward or forward; erase position not used.)
21. Warm water: Right ear, amount used.......................c. c.
Water temperature.........°C. Direction of nystagmus.........
(Head backward or forward; erase position not used.)
22. Cold water: Left ear, amount used..........................c. c.
Water temperature.........°C. Direction of nystagmus.........
(Head backward or forward; erase position not used.)
23. Warm water: Left ear, amount used.........................c. c.
Water temperature.........°C. Direction of nystagmus.........
(Head backward or forward; erase position not used.)

Rotation nystagmus.

24. Right rotation: Applicant to be turned toward his right, 10 turns, 20 seconds = left nystagmus.........seconds.
25. Left rotation: (opposite above) = right nystagmus........seconds.
NOTE.—Note in this space by number tests not used. See circular of instructions...

DYNAMIC TESTS, HORIZONTAL PLANE, SHOES REMOVED.

Even numbers, eyes open; odd numbers, eyes closed.

26-27. Applicant to walk forward on feet flat to floor at least 20 feet, better 30 feet..
28-29. Backward on feet flat to floor.................................
30-31. Hopping backward on both feet flat to floor...................
32-33. Hopping forward on right foot flat.........................
34-35. Hopping backward on right foot flat.......................
36-37. Hopping forward on left foot flat...........................
38-39. Hopping backward on left foot flat..........................

If marked deviation from straight lines occur repeat tests 30 to 39 several times, and if deviation is persistent note the direction, and if consistent otherwise, note as satisfactory in space below. Very slight deviations, when eyes are closed, are not disqualifying.

Dynamic test ....
40. Chest measurement at expiration.........inches. At inspiration ....inches.
41. Respiratory system...
42. Bones and joints...
43. Skin ....
44. Nervous system...
45. Vascular system, pulse, rate...............quality...............
46. Condition of the arteries...
47. Blood pressure...
48. Heart ....
49. Varicose veins...
50. Varicocele ....
51. Hemorrhoids ....
52. Digestive system...
53. Hernia ....
54. Genito-urinary system...
55. Is the candidate physically qualified for aeronautical duty?........
56. In the space below a more detailed statement may be made covering any of the foregoing tests or questions. Refer to by number only ....
....
....
....
....

5. By direction of the Surgeon General the following instructions will govern the medical officers making the physical examination of an applicant for detail in the Aviation Section of the Signal Corps:

EYE DETERMINATION.

Question the candidate carefully regarding previous eye trouble, including scotomata, headache after excessive use of the eyes, diplopia, etc. Diplopia disqualifies.

Visual acuity of less than 20/20 in either eye disqualifies. Vision to each eye to be tested separately at a distance of 20 feet. The "near point" is determined for each eye separately by requiring the candidate to read the Jaeger's No. 1 test type and gradually bringing the card toward his eye until the nearest point to the eye at which the test type still remains distinct is reached. The distance of this point from the anterior surface of the cornea, measured in centimeters, is the near point.

Ocular movements are tested roughly by requiring both eyes to be fixed on the examiner's finger, which is carried from directly in front to the right, to the left, up, and down. The excursion of the movements of each eye must be regular and identical.

Ocular nystagmus is determined and, if it is rythmical and if it occurs on looking straight ahead or laterally, 40° or less, it is a cause for rejection.

Spontaneous ocular nystagmus produced by extreme lateral sight—50° or more—is not a cause for rejection, as it is found in the normal individual. It is usually manifested by a few oscillating lateral movements which appear when the eyes are first fixed in extreme lateral positions. Select a scleral vessel near the corneal margin as a point to observe the ocular movement.

Muscle balance for distance is tested to determine heterophoria. A preliminary test should show that the pupils react equally to distance and to light. Seat the candidate 20 feet from a lighted candle in a darkened room. Adjust the trial frame in a true horizontal position and assure a correct relation between horizontal and vertical lines when using a prism. This can be done by accurately placing the scratch mark on the prism base at 90° or 180° on the trial frame.

Test the horizontal muscles for balance by placing before the right eye in the trial frame, base up, a prism of 6° with the scratch mark on the prism at 90°. The resulting vision will be vertical diplopia with the lower flame seen by the right eye. If there be a perfect balance of the internal and external muscle, the flames will be seen on a vertical line. If the lower flame be displaced to the applicant's left, there is exophoria; if to applicant's right, esophoria.

The amount of imbalance is determined by placing in front of the left eye (base in for exophoria, or base out for esophoria) that strength of the prism which will restore the two flames to a vertical line.

Test the left eye in the same manner.

Test the vertical muscles for balance by placing a prism of 12° before the right eye with base in and scratch mark at 180°. If the flames appear on a horizontal plane, no tendency to deviation exists. If the right image be higher than the left, with the displacing prism over the right eye, there is right hyperphoria. The degree of hyperphoria is measured by the strength of the prism placed before the left eye, base down, which brings the flames on a horizontal plane.

Test the left eye in the same manner.

Over 2° of heterophoria is a cause for rejection.

Total refractive errors of each eye are determined subjectively, or by the retinoscope, after the use of a cycloplegic. A 2 per cent solution of homatropine hydrobromide is recommended. One drop is placed in each eye every 10 minutes for 6 doses. One-half hour after the last dose the vision of each eye is taken separately. Following the refractive tests a thorough ophthalmoscopic examination is made for abnormalities and disease.

EAR DETERMINATION.

Auditory acuity less than 20/20 in either ear is disqualifying. To obtain uniform results, the hearing of each ear is tested separately with the candidate standing 20 feet from the examiner and facing away from him. An assistant tightly closes the ear not under examination by pressing the ball of the index finger in the external meatus, and the examiner then exhales and with residual air whispers various words and numbers which the candidate is required to repeat. This test should be repeated by using the ordinary low voice. The result of each test is recorded by using a fraction which has the normal test distance in feet (20) for the denominator and the distance through which the test sound is correctly heard as the numerator. In testing the hearing by the watch, first determine by actual trial the *average* maximum distance at which five men with apparently normal hearing and normal membrani tympani heard the watch, when their eyes are closed. In recording the result, this number in inches is taken as the denominator and the distance at which the candidate hears the watch, with one ear occluded and both eyes closed, as the numerator.

The examination of the external auditory canal and the membrani tympani is made with the ear speculum, under good illumination by reflected light. The examiner will note any deviation from the normal, such as a small or tortuous external canal, the presence of pus or odor, any evidence of recent or past inflammation, perforations, scars, or thickness or retraction of the membrane, general or localized congestion along the handle of malleus or any other abnormality. Perforation of the membrani tympani, pus in the middle ear, or any diseased condition of the middle ear, is a cause for rejection. The external auditory canal must be free from wax.

Patulous eustachian tubes are determined by politzerization. If the eustachian tubes are normally patulous, a feeling of fullness in the ears during the operation, relieved by the act of swallowing or yawning, is the result. A perforation of either ear drum is a cause for rejection of the applicant, and is a contraindication to irrigation in making the following examination.

Vestibular nystagmus is determined by a calorific test in which warm or cold water is injected into the external auditory canal against the ear drum. Nystagmus, induced by the calorific test, should show the movement toward the irrigated ear when warm water is used, and toward the opposite ear when cold water is used.

To make the calorific test prepare about 100 cubic centimeters of water for irrigation of the ear and at such a temperature that the water enters the external auditory canal at 27° C. Place the applicant in the "optimum position," i. e., with his head bent backward 60° from the vertical line and the eyes looking toward the ceiling and turned slightly away from irrigated side. Irrigate, without force, the right ear with a fountain or bulb syringe and a small nozzle or catheter, while carefully watching the eyes of the applicant. As soon as nystagmus occurs, which should be toward the side opposite the irrigated ear, note the number of cubic centimeters of water used and whether the nystagmus is strong or weak.

When the nystagmus entirely ceases, place the applicant in the "pessimum position," i. e., with his head bent forward about 90°, or until the chin lightly touches the chest, and with the eyes turned slightly away from the irrigated side, repeat the test by injecting more water at the same temperature and note the amount of water and the strength of the nystagmus as before. Should nystagmus not occur with this procedure, use water at 20° C. If nystagmus does not then result, place the applicant in the optimum position, use water at 40° C., and note again the quantity of water and the direction of the nystagmus, if it be induced. Failing to produce nystagmus by these procedures, place the applicant in the "second optimum position," i. e., with the head bent backward 60° from the vertical position and tilted 45° toward the shoulder on side irrigated, and note whether or not nystagmus occurs.

If nystagmus be induced by the foregoing tests, vestibular nystagmus is positive, or shows normal reaction, to calorific tests only. Test each ear.

Rotation nystagmus is determined by the rotation test. This test need not be performed if the calorific test be positive.

Place a trial frame on the applicant far enough forward so that both eyes can be observed from the side and with an opaque disc before each eye. Place the applicant erect on a revolving stool or chair and turn him clear around 10 times in 20 seconds *to the right,* and observe the direction of the nystagmus and also the number of seconds the nystagmus continues after rotation stops. The direction of nystagmus should be opposite to the direction of rotation. This observation can be better made if the applicant turn his eyes 50° to the left after rotation. Repeat this same test, rotating applicant to the left.

This test is positive, or shows a normal condition of the vestibular apparatus, if nystagmus persists for the same number of seconds after rotation in each direction.

The calorific test has the advantage of testing each vestibular apparatus separately, while the rotation test is bilateral. In ocular nystagmus the motion of the eyes are of equal lengths and quickness. In vestibular nystagmus the length of the motion is equal, but there is a quick and slow component; the quick component being more readily observed, is taken to designate the direction of the nystagmus. Fixation of vision stops nystagmus, but turning the eyes in the direction of the quick component starts it again. The average duration of horizontal vestibular nystagmus, produced by rotation, is about 40 seconds.

If calorific nystagmus be present on one side and not on the other or if rotation nystagmus be only half as long on one side as on the other, it is an indication of vestibular disease.

In the calorific tests the object of bending the head backward 60° from the vertical plane is to bring the external semicircular canal to the vertical position, in which position the flow of the endolymph is favored and nystagmus is produced. When the head is erect this semicircular canal is inclined forward at an angle of 60° from the vertical plane. When the head is inclined forward 30° from the vertical plane, with the chin touching lightly upon the chest, the canal is in a horizontal plane, and in this position nystagmus is not so readily induced.

In the static tests position 16 (number refers to section on examination blank) should be maintained for two or three minutes, without marked swaying. Position 17 should be maintained for a minute without marked swaying. Positions 18 and 19 should be maintained one-fourth to one-half of a minute. Occasional attemptts at balancing are of no significance. In the dynamic tests a wide difference between the trials with the eyes open and with the eyes closed, and persistently wide deviation from a straight line to one side, is not admissible. A positive inability to stand the tests from Nos. 32 to 39 is a cause for rejection. A slight degree of uncertainty and deviation, with eyes closed, is allowable.

Spontaneous ocular nystagmus should be produced only on *extreme lateral* turning of the eyes. If it occurs on any easy turn of the eyes to the right or left of 40° or less, from looking straight to the front, it renders the applicant unfit.

BY ORDER OF THE SECRETARY OF WAR:

A. L. MILLS,
Major General, General Staff,
Chief of the Militia Bureau.

AN EFFICIENT FACTORY SYSTEM

As a result of the application of the most efficient factory management the Curtiss Aeroplanes and Motors, Ltd., of Toronto, Canada, is one of the best working aeronautical organizations on the North American continent. Reference to the accompanying diagram will suffice to prove that from a geographical standpoint the arrangement of the plant leaves little to be desired. Every department is in the precise location that it should be towards the other to secure the best results.

When an order is received for say a certain number of Model "C" aeroplanes, the works manager, Mr. J. A. D. McCurdy, immediately notifies the chief engineer, Mr. F. G. Ericson, of the fact, at the same time issuing instructions to the production department in charge of Mr. Roy Keys to prepare for production of these machines.

The engineering department then immediately begins to release stock lists, bills of material, specifications, assembly and detail drawings, copies of which go to production, purchasing, inspection and manufacturing departments, and customer's inspector.

The production department as soon as stock lists, specifications and bills of material are available, issues purchase requests for the necessary raw or finished material to the purchasing department. Before purchase requests are issued the production department is notified by the accounting stores department of the amount of stock already on hand, which is deducted from the total amount of material required, the balance being the amount of material on the requisitions.

The purchasing department simultaneously with the issue of purchase order to the vendor, forwards copies of these orders to the receiving department and accounting stores department.

As soon as goods are delivered by the vendor, the inspection department, under the direction of Mr. Blankman, takes charge and all material is inspected by said inspection department and the owner's inspector, after which acceptance and rejection slips are forwarded to the production and receiving departments, and accepted material is turned over to physical stores. The receiving department issues receiving report to accounting stores department.

In the meantime instructions re. constructional methods are issued by the engineering department to factory superintendent, Mr. E. Ashworth, who charges the various foremen with their execution. Actual work is then ready to start.

The factory foremen requisition the necessary material from the physical stores department, and upon issue of material from the physical stores department, a copy of the requisition is forwarded to the accounting stores department and in case of shortage the production department is notified. The flat cost of production is obtained as follows:

To the floor time checked against the clock time by the cost and pay roll department is added the extended requisi-

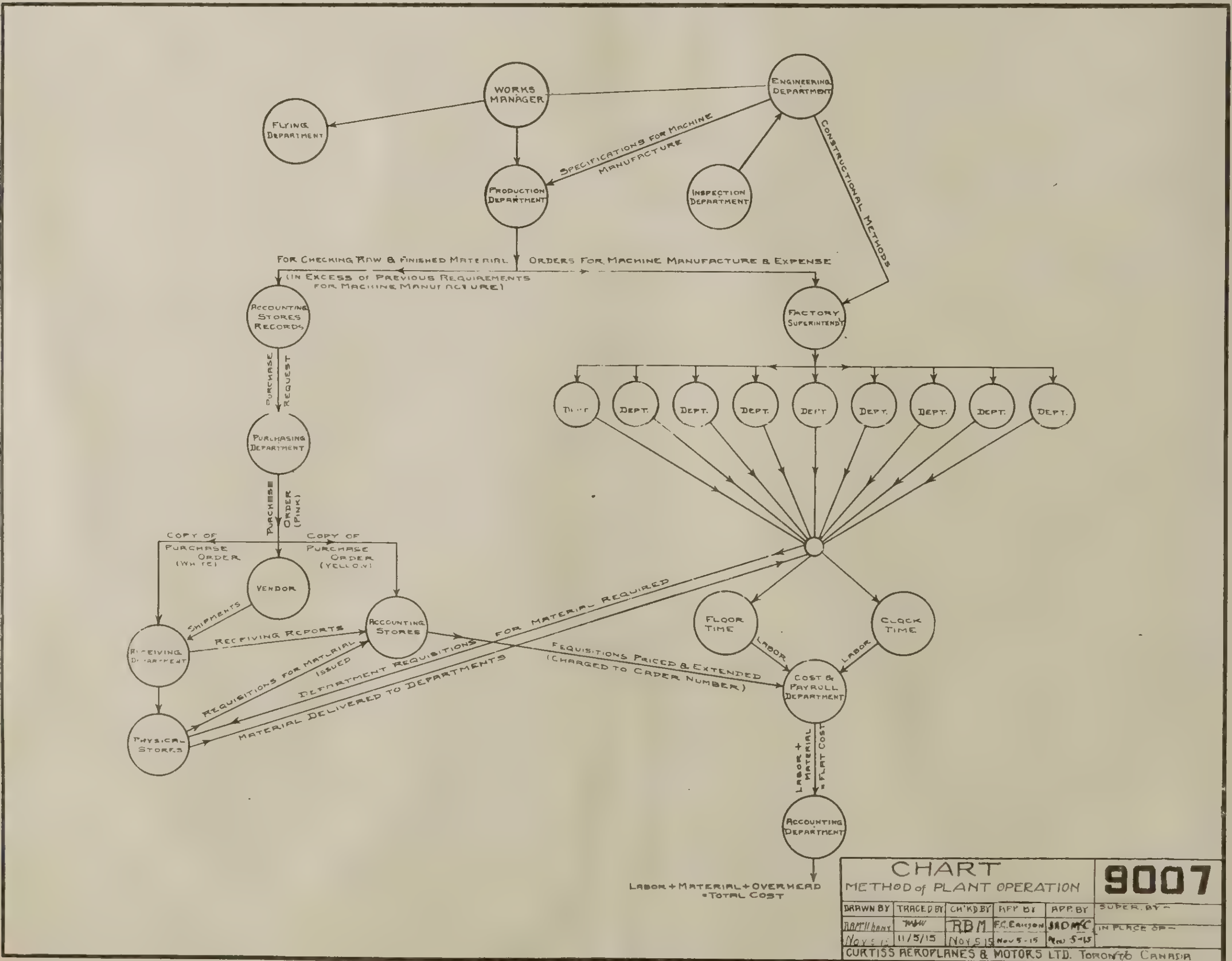

WORKS MANAGER
ENGINEERING DEPARTMENT
FLYING DEPARTMENT
SPECIFICATIONS FOR MACHINE MANUFACTURE
PRODUCTION DEPARTMENT
INSPECTION DEPARTMENT
CONSTRUCTIONAL METHODS
FOR CHECKING RAW & FINISHED MATERIAL
(IN EXCESS OF PREVIOUS REQUIREMENTS FOR MACHINE MANUFACTURE)
ORDERS FOR MACHINE MANUFACTURE & EXPENSE
ACCOUNTING STORES RECORDS
FACTORY SUPERINTEND'T
PURCHASE REQUEST
DEPT.
DEPT.
DEPT.
DEPT.
DEP'T
DEPT.
DEPT.
DEPT.
DEPT.
PURCHASING DEPARTMENT
PURCHASE ORDER (PINK)
COPY OF PURCHASE ORDER (WHITE)
COPY OF PURCHASE ORDER (YELLOW)
VENDOR
SHIPMENTS
RECEIVING REPORTS
RECEIVING DEPARTMENT
ACCOUNTING STORES
FOR MATERIAL REQUIRED
REQUISITIONS FOR MATERIAL ISSUED
DEPARTMENT REQUISITIONS
MATERIAL DELIVERED TO DEPARTMENTS
PHYSICAL STORES
REQUISITIONS PRICED & EXTENDED (CHARGED TO CADER NUMBER)
FLOOR TIME
CLOCK TIME
LABOR
LABOR
COST & PAYROLL DEPARTMENT
LABOR + MATERIAL = FLAT COST
ACCOUNTING DEPARTMENT
LABOR + MATERIAL + OVERHEAD = TOTAL COST
CHART
METHOD of PLANT OPERATION
9007
DRAWN BY
TRACED BY
CH'KD BY
APP. BY
APP. BY
SUPER. BY—
IN PLACE OF—
RBM
F.C. Ericson
Nov 5 15
11/5/15
Nov 5 15
Nov 5-15
Nov 5-15
CURTISS AEROPLANES & MOTORS LTD. TORONTO CANADA

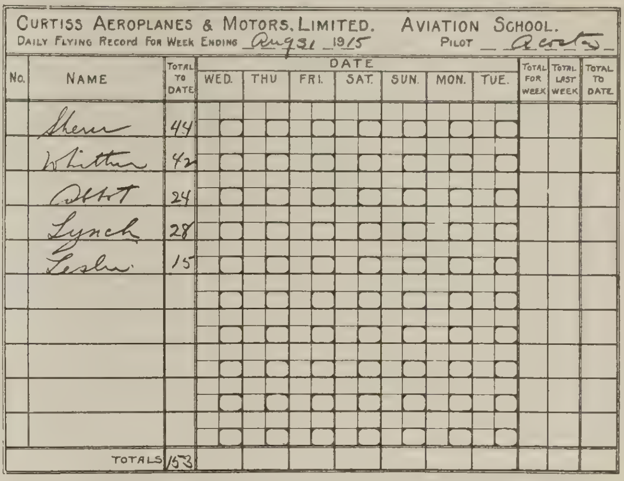
Diagram showing the efficient arrangement of the Curtiss Aeroplanes & Motors, Ltd., at Toronto.

tion prices, each to its proper order number.

The total cost is obtained by the addition of overhead cost to the flat cost, by the accounting department.

Aerial Freight

Aerial freight service between Chicago and Milwaukee was established August 21st by a remarkable flight made by Farnum T. Fish, 18-year-old boy aviator. Fish flew to Milwaukee in two hours and 16 minutes. He carried with him 40 pounds of silk, consigned by a Chicago jobber to a Milwaukee department store. The silk was delivered safely and new possibilities in the way of aerial delivery service thus opened.



CURTISS AEROPLANES & MOTORS, LIMITED. AVIATION SCHOOL.
DAILY FLYING RECORD FOR WEEK ENDING Aug 31 1915 PILOT Acosta

			DATE									
No.	NAME	TOTAL TO DATE	WED.	THU	FRI.	SAT.	SUN.	MON.	TUE.	TOTAL FOR WEEK	TOTAL LAST WEEK	TOTAL TO DATE
	Sherm	44										
	Whitten	42										
	Abbott	24										
	Lynch	28										
	Leslie	15										
	TOTALS	153										

Method of keeping accurate record of students' flights.

Specimen of notices posted throughout the factory which are rigidly enforced by the foremen of departments.

NOTICE

NO POOR WORK WILL BE TOLERATED IN THIS DEPARTMENT UNDER ANY CONSIDERATION. IT IS ESSENTIAL THAT EMPLOYEES GIVE THEIR UNDIVIDED ATTENTION TO THE WORK UNDER THEIR CONTROL AND CO-OPERATE WITH THE MANAGEMENT TO TURN OUT NOTHING BUT THE BEST WORKMANSHIP

CURTISS AEROPLANES & MOTORS LTD. TORONTO CANADA

Says Aeroplane Will Help Alaska

AN aerial freight service to the distant and isolated mining camps of Alaska will be a rapid development from the proposed aerial mail route, in the opinion of E. F. Wann, of Chisana. Wann is a mining operator of the North who is in Seattle on his first trip "out" in three years.

"The chief trouble with many of the excellent mining camps of Northern Alaska," said Wann to-day, "is that supplies are too high to justify working for normal returns. Mining men of Chisana calculate that their raw food, which they prepare themselves, costs in excess of $2.00 a person each day. An ordinary meal at a roadhouse costs nearly as much. Transportation is the big problem.

"An aeroplane carrying 1,000 pounds of freight would be a practical means of getting supplies to the distant camps. Where now it takes six days to get supplies from the nearest distributing point to Chisana, such an aerial route would make the trip possible in a few hours. I believe that if the aerial mail route is successful, the next step will be an aerial freight service."

Personal Pars

First Lieut. M. M. Eberts, U. S. A., of Little Rock, has been transferred to the aviation section of the Signal Corps and is now in the aviation school at San Diego, Cal., for instruction. He was graduated from West Point with the class of 1915 and commissioned second lieutenant, assigned the Third Infantry. He was promoted to first lieutenant July 1st and volunteered for the aviation section.

Baxter Adams made exhibition flights at the South Dakota State Fair at Sioux Falls, September 11th to 15th.

De Lloyd Thompson will make flights for the Montana State Fair Association, September 25th to 30th, at Helena.

Moonlight airship flights have proven such a novelty to resort visitors that Aviator Beryl H. Kendrick has planned to give patrons an opportunity to view Atlantic City's great white way by night during the next few weeks while aviation parties are in vogue.

Utah Aircraft Corporation Organized

Incorporation papers for the Utah Aircraft corporation have been filed with the secretary of state.

It is set forth in the papers that the purpose of the company is to manufacture and sell craft designed "to sail in the air." The capitalization is for $10,000, divided into shares of $1 each. The incorporators are: James P. Olsen, Jr., president; William C. Bawdidge, vice-president; Julian M. Thomas, secretary-treasurer; James P. Olsen, Sr., and Ellen Olsen.

Under the terms of the incorporation, the company attains all rights to certain patents upon inventions of devices, for aircraft equipment, the rights being surrendered to the company by James P. Olsen.

REPORT OF THE BRITISH ADVISORY COMMITTEE FOR AERONAUTICS

A LARGE increase in the amount and extent of the work carried out under the control of the Advisory Committee for Aeronautics has taken place as a result of the war.

Mr. Tennyson d'Eyncourt, Director of Naval Construction, was recently appointed an additional member of the committee.

Some new problems have required attention during the course of the past year, but in the main the work has been directed to meeting the immediate needs of the Services in regard to the design and development of aircraft. The main principles to be followed in design, and the more immediately necessary general data required in their application, had been determined previously, but the developments in detail have been very numerous, and the detailed information required as to the aerodynamic properties of a number of different types of machine, with the proposed modifications arising in the course of design, have entailed a great amount of experimental work. Progress with a number of investigations of more general character, and of considerable importance, has in consequence been unavoidably delayed, but the increased facilities recently provided, to which reference is made below, will, it is hoped, render possible a more rapid advance with researches relating to the general aerodynamic characteristics of the aeroplane, which have a direct bearing on the improvements of all types of machine.

Provision for Experimental Work at the National Physical Labratory—The fundamental necessity, in the development of aircraft, of proceeding on the basis of exact knowledge derived from accurate investigation under experimental conditions is now clearly recognized in this country, and the demand for exact information has led to continuous growth in the provision made for experimental work at the National Physical Laboratory. This provision now covers four main branches of research: (1) Aerodynamics, including the determination of the forces acting on models of aircraft, and of their various parts, as well as general investigation of the motion of bodies through fluids.

(2) The study of fabrics for use in the construction of aircraft, and of methods of proofing and protection, the examination of dopes, varnishes, protective pigments, etc., and other chemical work. (3) The investigation of materials, especially light alloys, for use in aircraft construction, and their production under manufacturing conditions.

(4) The examination of special questions which arise in connection with airships or seaplanes in relation to their use at sea. In addition to these four principal sections of the work, a large number of special questions receive attention from time to time at the laboratory, *e. g.*, those relating to instruments or accessories for use on aircraft, the investigation of breakages, etc.

The principal equipment available at the commencement of the period under review, for research in aerodynamics, comprised three air channels, a 3-ft., a 4-ft., and a 7-ft., together with a whirling arm for tests of propellers, and some small air and water channels for the photographic investigation of fluid motion. Under the conditions existing these have not been found sufficient during the past year to enable the requirements of the Services to be met, and, at the urgent request of the Admiralty and War Office, additional channels have recently been constructed and are now in use. The 7-ft. channel had been found of great service in general experimental work, and, after careful consideration, it was arranged that a second 7-ft. channel should be provided, as well as another 4 ft., together with the necessary machine tools for model-making and other incidental equipment. New buildings had to be erected for these channels, as well as for the increased office and workshop accommodation necessary. The erection of these buildings, the construction of the channels, and the provision of much of the equipment was undertaken with the consent of the Treasury, by the Office of Works, and the committee is much indebted to Mr. Baines, the principal architect of the Office of Works, for the rapid and successful completion of the work. The necessary provision has been made by the Treasury for the increased staff required for working the new channels.

Some additions to the staff and equipment have also been necessary in the departments dealing with fabrics and chemical work, and light alloys, respectively. The rolling mill, to which reference has been made in previous reports, has been at work for some time, and its value has been very fully demonstrated during the past year.

By express desire of the Admiralty provision has also been made for a considerable increase in the experimental work in connection with seaplanes, carried out in the William Froude National Tank.

As a result of the experience gained with the earlier channels some improvements have been introduced in the new equipment, in the design of the channels and of the measuring apparatus employed. Continued experience has confirmed the accuracy and convenience of the methods of measurement adopted. A recent report of the Smithsonian Institution states that the Massachusetts Institute of Technology, after careful study of existing channels in other countries, has adopted in its Aeronautics Laboratories a channel and balance of the N. P. L. type, with but slight modifications. Drawings of the balance for the 7-ft. channel have also recently been furnished, at their request, to the Navy Department at Washington.

Experimental Work in Aerodynamics—The work done in the air channels has been largely directed to the determination of data immediately required for purposes of design. A considerable amount of information of general value has, however, been obtained and will be published later. Use of the 7-ft. channel has enabled the range of values of vl/v at which experiments are conducted to be appreciably extended, thus throwing further light on the exact numerical relation between the full scale and model co-efficients which define the wind forces. Experiments on spheres have been made, both in the wind channels and in a natural wind, and the results compared with those obtained in other laboratories, especially those of Eiffel and Prandtl. The urgency of other work has, however, prevented the complete interpretation of the varying results obtained for spheres of different sizes at different wind-speeds: it is hoped that opportunity will arise later of carrying to a successful conclusion this investigation, which is of great theoretical interest and may throw light on other questions of more immediate practical importance. Similar series of experiments have been conducted on struts and fair-shaped wires, as well as on wing forms; while the effect of change of scale on the region of unstable flow has been examined for aerofoils of special type.

Much time has been devoted to measurements of the wind-forces on complete machines, and examination of the results of modification of individual parts. The results thus obtained will be of general interest and of importance in future design.

A new apparatus for the measurement of moments has been designed and constructed, and enables higher accuracy to be attained than that hitherto employed.

Apparatus has also been devised for measuring the velocity and direction of flow in the air current at any point in the neighborhood of a model. This will facilitate the study of the velocity distribution and the character of the flow round models, and will assist in the explanation of observed variations in the wind-forces on auxiliary surfaces.

Some further questions in connection with the stability of the aeroplane have been investigated. Continued application has been made of the theory previously developed and some improvements in detail have been effected. In particular the effect of the use of the controls has been examined.

Experiments on models of kite balloons have been made and the conditions affecting the equilibrium of more than one type examined. The stability of these balloons has also been investigated. The conclusions reached are of definite practical importance, and, when applied in practice, should overcome some of the difficulties hitherto experienced in the manipulation of kite balloons.

Air-screws—With a view to securing increased accuracy in the designing of air-screws to fulfill specified conditions new apparatus has been designed for the testing of air-screws in a wind channel and for determining the distribution of pressure over the blades. Careful comparison has been made between the results of air channel measurements on air-screws and those obtained from experiments on the whirling arm. In connection with this work close examination has been made into the degree of accuracy obtained in the experimental methods employed in tests of air-screws on the whirling arm. The result of these investigations was to confirm the satisfactory character of the results obtained in the observation on the whirling arm and to show that channel measurements on air-screws, under the conditions adopted, can also be relied upon to give accurate results. In view of the great saving of time and labor it is proposed, in general, in future, to employ air channel methods in the testing of air-screws.

The continued use of the existing air channels on more immediately urgent work has delayed somewhat the further prosecution of the experiments on air-screws. With the additional channels now available it is hoped that it may be found possible to resume the investigation at an early date.

Strength of Construction—The considerations affecting the views held as to the "factor of safety" to which manufacturers should work in aeroplane design and construction have been somewhat complicated by the introduction of new factors arising out of the conditions and dangers of active service in the field. The preliminary figure laid down by the committee has, however, been found convenient in general as a basis for design. Considerable attention has from time to time been given to improvements in detail, and continued investigation into all questions affecting the strength and durability of the machine tends constantly to increased security. In particular, a number of cases of theoretical interest have been investigated of a fracture or failure occurring owing to vibration originiated by the engine or other cause, with synchronization and resonance in the part affected.

A large number of investigations have been carried out during the year at the request of the Service Departments into methods and processes employed in the construction of aircraft and engines. Among these may be mentioned the use of autogenous welding, the annealing of hard drawn steel tubes, methods of soldering in connection with light alloys, etc. Some of these investigations have led to important results of more general value.

A suggestion was made to the committee that certain Australian timbers exhibited special properties which might render them of value in aeroplane construction. By the courtesy of the Agent-General for Western Australia specimens of some of these timbers are being placed at the disposal of the committee, and will be submitted to trial.

Experimental Work in the William Froude National Tank—A number of investigations in relation to aircraft have been carried out during the year in the Froude Tank. In particular, the experiments on floats have been continued and extended. In view of the importance of this work an urgent request was made by the Air Department of the Admiralty for increased facilities, and additions have accordingly been made to the staff and eqiupment, for which special provision has been granted by the Lords Commissioners of H. M. Treasury.

Fabrics—The work done by the "fabrics" department of the laboratory includes the examination of the strength, permeability, and other properties of airship and aeroplane fabrics, the investigation of methods of gas proofing and waterproofing, and of dopes, varnishes, paints, etc. The work during the past year has been exceptionally heavy, and numerous matters have arisen requiring special investigation. The committee is indebted to the Autotype Company and to the North British Rubber Company for assistance rendered in the experimental investigation of methods of proofing fabric and preventing deterioration.

Interesting results have been obtained from the examination of fabrics exposed in the tropics. The experiments have been carried out with the co-operation of the Air Department of the Admiralty.

Light Alloys for Aircraft Construction—The systematic study of light alloys for aircraft construction has been continued. In this connection the experimental rolling mill recently provided, and referred to in previous reports, has been of the greatest value and has enabled the examination of these alloys to be continued beyond the laboratory stage under conditions closely approximating to those which arise in manufacturing practice, but with greater facilities for the precise control of the various factors affecting the quality of the product, such as the exact constitution of the alloy, the temperature of rolling, etc.

A number of special questions relating to alloys have been referred to the department for investigation, and it has been necessary to ask for an increase in the provision made for such work.

Special Matters—Experiments have been carried out on the aerodynamic properties of bombs, and investigations and calculations have been made with regard to the flight of bombs, with a view to increased accuracy of aiming. The commandant of the Central Flying School has furnished valuable assistance and information to the committee in this connection from the results of experiments there undertaken.

Questions connected with the aeroplane compass were laid before the committee by the Superintendent of the Royal Aircraft Factory in the Autumn of 1913. These led to an examination into a number of points connected with the use of compasses on aircraft, in which members of the committee, assisted while a close study of the conditions affecting the aeroplane compass, with a view to its development and improvement, was undertaken at the Royal Aircraft Factory by Dr. Keith Lucas, F. R. S. As a result of these experiments, which commenced early in 1914, various modifications from the compass previously in use were suggested and adopted and a type of instrument specially adapted for employment on an aeroplane under the varying conditions which arise in flight was ultimately produced and standardized. Fliers are much indebted to Dr. Lucas for the success attained in this investigation. The committee desire also to thank the Admiralty Superintendent of Compasses for information recently furnished to them with regard to the type of compass adopted for naval use on aircraft.

Other questions which have been the subject of special investigation relate to the properties of permanent magnates as affecting their use in magnetos, the design of sighting apparatus, both for bomb dropping and in connection with aerial musketry, etc.

A number of special matters have been investigated at the request of the Board of Invention and Research and the Munitions Inventions Department. The committee has also given assistance to these bodies in the examination of patents and designs submitted to them, relating to projected improvements in aircraft.

Full Scale Work at the Royal Aircraft Factory

Full scale research by experiment and observation upon aeroplanes in flight has been continued, and written records of the flight path, both controlled and uncontrolled, have been obtained. Many improvements in engines, air-screws and controls can only be made as the outcome of experiment upon actual machines, and these tests occupy the larger part of the flying time of the necessarily restricted number of aeroplanes available.

As regards aerodynamic qualities, it has become increasingly important to predict with accuracy the performance and stability of an aeroplane while it exists only in drawings, and to be able to arrange that the movement of its center of gravity, etc., are such as to ensure that it shall have adequate stability and control.

It has been possible, by the issue at the outbreak of war of complete working drawings, to obtain strong, stable and serviceable aeroplanes in quantity from firms who had no previous experience of aircraft building.

By the analysis of observations taken in experiment upon aeroplanes in the air in climbs, glides and level flights, progress is being made toward determining the aerodynamic characteristics of the aerofoil and other parts, so that a guide may be available for correctly interpreting the model results and linking them with the full scale data.

Strength of Construction—The value of strength and good construction in saving aeroplanes from damage and reducing the amount of work required for their efficient upkeep in the field has been fully borne out by the experience of the Expeditionary Force. In view of considerations of safety of a different kind, which render necessary the sacrifice of all possible weight in the interest of the highest performance, the instruction calling for a strength factor of six, to be increased, if possible, to twelve, has been varied in practice, so as to admit in some cases a substantially diminished factor. This lower factor demands that still greater precision in calculation of strength shall be used. Instruction and information as to these calculations has been freely given to aeroplane constructors and designers.

Recent laboratory tests have shown that the raf-wires of the type developed at the Factory show little or no aerodynamic disadvantage as compared with wires of stream-line section, and in view of their mechanical advantages and easier production they have accordingly been standardized and their use has been put at the disposal of aeroplane constructors. Universally jointed end fittings have been employed as an additional precaution against the effect of vibration. The reliability of the wires, when properly heat treated, has been assured by vibration tests at the laboratory.

Great attention has been paid to the thorough testing of all metals used in aircraft construction, and a specimen from every bar is individually tested. Owing to the high demand for mild steel of less good quality for shells, the difficulty found in obtaining the better class of material required for much of the work on aeroplanes has been overcome by micrographic and temperature studies of the metal at the factory, and the treating of the steel as delivered till the better quality is secured. Advice and assistance has been given to constructors with regard to their heat treatment plant.

Design and Construction of Aeroplanes—New machines and new wing sections have been designed to take advantage of new knowledge, and appreciable improvement for a given engine power and weight has been obtained. Development proceeds by the making of a few trial machines, and four main types have been standardized for contract purposes. In new types guidance has been received from the experience of the Royal Flying Corps in the field, and in all cases it has been found possible to secure stability under ordinary flight conditions. Certain aeroplane constructors have taken advantage of a new device for saving weight in design, of a fan-shaped design of tail, a steerable rear skid, and other details. Special attention has been given to the provision of suitable landing gear, and in large machines and air and oil recoil mechanism has been successfully introduced. The improvement of air-cooled and of water-cooled engine design and construction has been the subject of continued study, resulting in new designs and their development, with the help of the firms concerned. Two new devices are being tested for improving the performance at heights.

Instruments—Owing to the greatly increased demand for aeroplane instruments, the work in this connection has been very much augmented, the labor of correction and adjustment of deliveries being considerable, and much instruction and assistance has been given to instrument firms. A new air speed indicator of the metal diaphragm type has been designed and tested. Improvement has been made in the system of electric lighting of instruments. The National Physical Laboratory method of test of instrument dials painted with luminous paint has been of great assistance, and the test is now specified as standard by the Royal Aircraft Factory. The temperature and lag errors in aneroids are being investigated and their remedy considered. An improved engine speed indicator is designed and is under construction. The investigation relative to the aeroplane compass, already referred to, has led to the production of the R. A. F. Mark II. Compass, which is now being made by contract in large numbers for the Royal Flying Corps.

Two wireless telegraphy sets of very light weight have been designed and tested, and the investigations relative to finding the true vertical on aeroplanes in flight have progressed satisfactorily, as well as the evolution of optical systems for convenient observation of bomb dropping from aeroplanes.

Whirling Arm—The whirling arm at the Royal Aircraft Factory has been used for tests of full scale air-screws, and modifications made to give speeds up to 70 miles per hour. The results have been valuable in studying the relation between model and full scale observations taken on aeroplanes in flight. Comparative experiments are also in progress at the National Physical Laboratory.

Fabrics and Dopes—Experiments with various types of fabric have been in progress in connection with visibility and with a view to lowering the weight of the fabric covering of wings, and decreasing the amount of the tightening and protecting film necessary. It has also been found that a method of abandoning the use of poisonous ingredients can be relied upon. Protracted experiment has led to the conclusion that the greater part of the deterioration of the film on aeroplane wings is due to the actinic portion of the sun's rays, and it has been found that effective protection can be obtained by the application of a finishing varnish containing pigment, and that advantage is gained by the avoidance of drying oils in contact with fabric. The use of the pigment is also serviceable in certain cases in rendering aeroplanes, when on the ground, less visible from above.

Other Matters—A large number of special tests have been made on oils and pertols, the design of magnetos, in which assistance has been given by experiments at the National Physical Laboratory, the design of spark plugs, the design of shell for special purposes, gun mounts, fire grapnel, etc., on thin tubular struts, on sound detection, on the stability of bombs, on the gas distribution in engines, the use of air-screws of variable pitch, and many other problems. A special speed measuring course has been laid out for determining aeroplane speeds at heights.

Naval Work

The assistance of the committee has been given to the Air Department of the Admiralty in connection with a number of important problems, in which laboratory experiment was desired in conjunction with investigatory work proceeding on the full scale. Among the questions dealt with may be mentioned the design of airships, both rigid and non-rigid, the mooring of airships over the sea, points in connection with the design of seaplane-carrying ships, the design of wind screens near airship sheds, and the equilibrium and stability of kite balloons. The National Physical Laboratory has also been working in co-operation with the Air Department in relation to airship fabrics, dopes for aeroplane fabrics, the production of light alloys, and other matters.

As mentioned earlier, a request was made by the Air Department of the Admiralty for an increase in the facilities for tests of seaplane floats and flying boat hulls. The necessary provision has been made for this, and the full scale work on machines of new types is being carried on in conjunction with model tests in the William Froude Tank at the National Physical Laboratory. The utility of the model work has been fully demonstrated in the full scale tests.

New types of aeroplanes and seaplanes have also been developed by the Air Department, with the aid of wind channel tests at the National Physical Laboratory, and the co-operation of the Committee has been obtained with reference to a number of special matters, especially in regard to auxiliary apparatus for use on aircraft.

Meteorological Work

The experimental work of the year has been mainly concerned with arrangements for the automatic recording of lightning flashes and ascertaining by wireless telegraphy the position of distant thunderstorms, with the object of giving warning of their approach to those interested. The Admiralty have arranged for the co-operation of the Naval Wireless Department, and the assistance of observers of weather in various parts of the country has been secured.

The work at South Farnborough is in charge of Temporary Captain C. J. P. Cave, of the Meteorological Section R.E., who is now meteorologist in charge of the Office at South Farnborough.

Arrangements are in progress for observations on the relation of various conditions of weather to visibility of near and distant objects.

In connection with the regular work of the Office at South Farnborough, information of various kinds as to the state of the atmosphere has been supplied to the Royal Aircraft Factory, information as to the structure of the atmosphere, as obtained by pilot balloons, to the Royal Flying Corps, the Aeronautical Inspection Department, and other centres.

The Office is in regular daily communication with the central Meteorological Office at South Kensington, for the transmission of the observations made locally and for the receipt and distribution of information collected and arranged at the Central Office. It has also been used for training meteorologists for duty with the Meteorological Section R.E.

There have been many changes in the professional staff, which now consists of Captain Cave and Mr. R. A. Watson Watt, B.Ss., of University College, Dundee.

Arrangements are in progress through Major G. I. Taylor, R.E., who has been appointed Professor of Meteorology, to improve the exchange of information between the air pilots and Meteorological Service, and to enable the collected records of weather and the experience of airmen, which is at present unrecorded, to be used for the advantage of the Air Services.

MERCEDES AERO ENGINE

(Continued from Vol. III, page 786).

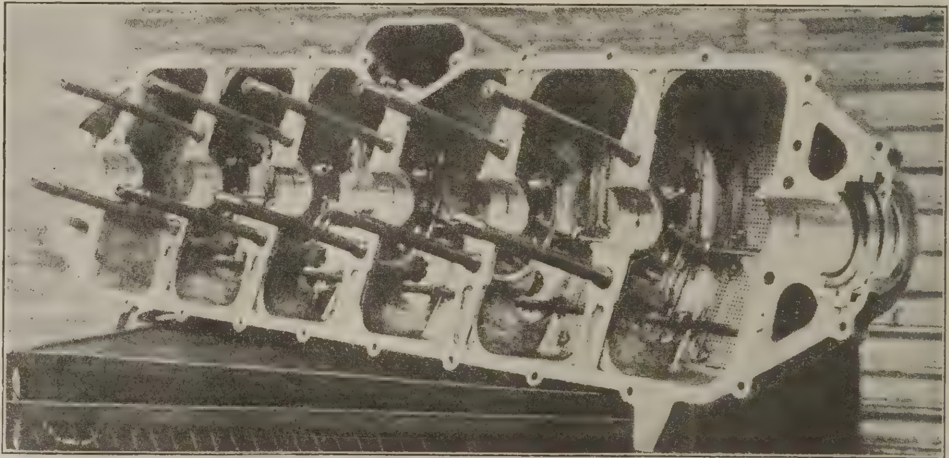
THE crankshaft, in spite of being hollow, weighs no less than 80¾ lbs. Its overall length is 5 ft., with a diameter of 55 mm. for the main bearings and 57 mm. for the crankpins, all such measurements, it must once more be emphasized, being only approximate, having been taken by callipers and not by micrometer gauge. Dimensions of the seven main bearings are: Fore-end (tractor screw) 90 mm. long, rear end 75 mm., five intermediate bearings 50 mm., crankpins 75 mm. long. Crank cheeks 24 mm. thick and 78 mm. wide at the front of the foremost main bearing is a double ball thrust washer to take the pull of the tractor screw, (Figure 3) and this is neatly enclosed in a bronze cover formed of two cups housed in an extension of the two halves of the basechamber. A similar extension at the rear encloses the bevel crown wheel and pinions forming the distribution gear, both such extensions being virtually oil baths for the lubrication of the enclosed parts. The bevel crown wheel in question is fitted to the crankshaft merely by splines or castellations, its position on the shaft longitudinally being determined by an aluminum cap bolted on to the main castings and housing a ball thrust that abuts against the crown wheel. Movement along the shaft inwards is prevented by the end thrust imposed by action of the bevels, any adjustment of the mesh of the teeth being made by packing up the ball race in its housing.

Two vertical shafts are driven from this bevel crown wheel, one above and one below. The former drives the magnetos, of which there are two, (Figure 7) the centrifugal water pump, and the overhead camshaft (Figure 1). The magneto platforms are arranged just above the crankshaft bevel, one on either side of the vertical shaft, and are cast integral with the top half of the crankcase. Steel straps secure the magnetos to the platforms, and the armatures are driven by a second bevel enclosed in a box that also serves to house the bearings from the vertical shaft. Further, above, the latter is splined, and by means of the splines drives the water pump that is mounted direct thereon. The pump casing forms a part of the tube enclosing the vertical shaft from the bevel box upwards. A third bevel at the top of the vertical shaft engages with a bevel on the camshaft, the latter also being enclosed in an oil tight casing throughout its length. The casing itself is of bronze and carries six boxes that enclose the cams and rocker arms, each box being bolted to its corresponding cylinder head, by which arrangement further stiffness to the cylinders, considered as a unit, is obtained. In the bronze enclosing the tube, the camshaft is carried in three long bearings, each consisting of an aluminum sleeve, split longitudinally, and lined with phosphor bronze. The driving bevel is not directly mounted on the camshaft, but on a separate hollow shaft through which it passes, the driving connection between the two being by splines. This is to permit of the camshaft being given a longtitudinal movement at will for an object to be detailed later, without at the same time disturbing the position of the bevel relative to the vertical driving shaft. A bronze sleeve bearing supports the hollow bevel shaft, this being retained in place of the tube by a flat bottomed plug screwing into a suitably-shaped recess in the bearing; the latter is split longtitudinally, the two halves being connected together by two dowel pins.

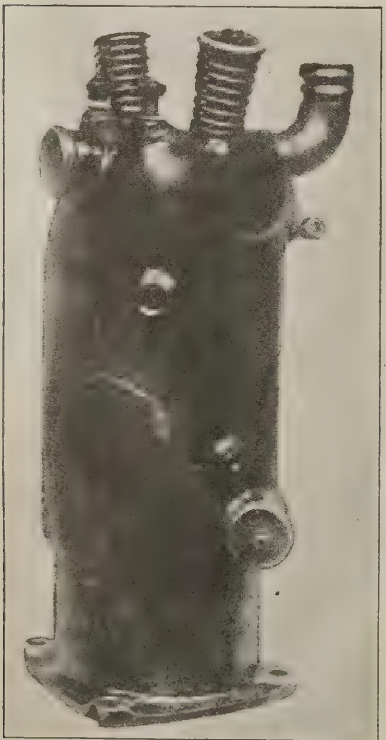
In addition to the cams, the camshaft carries an eccentric situated just in front of the bevel pinion, its purpose being to operate an air pump for the supply of pressure to the fuel supply. Each rocker has large bearing surface, bronze bushed. The outer end of the rocker arm carries a hardened steel adjustable tappet, which acts directly on the valve stem (Figure 5). Loss of oil from each box through the rocker arm exit is prevented in an ingenious manner, a felt pad held in a metal casing, pressing against the underside of the central boss carrying the metal bush of each rocker and also against a filling piece that, together with the boss, occupies the whole length of each arm rocker arm spindle. The latter are merely a driving fit in the side walls of the valve gear boxes, but have two small projections at one end that fit into notches in the wall and so are prevented from turning. Aluminum covers on each box give ready access to the interior.

We now come to what is perhaps the most interesting feature of the camshaft, whereby a half compression device is thrown into operation for ease of starting. It will be remembered that we spoke of the ability of the camshaft to be moved longitudinally in its bearings without disturbing the mesh of the bevels. To enable this to be done, the camshaft carries on ball bearings at its extreme rear, a sleeve having on its outer face a quick screw thread. A cylindrical collar encircles this with corresponding threads on its inner face, the collar being held rigidly in the housing by which it is enclosed. To the collar is attached a hand lever at right angles to the axis of the camshaft, so that by swinging the handle around this axis, movement fore and aft is imparted to the sleeve by means of the thread, and so to the camshaft itself through a ball-thrust washer. On the exhaust cams there is on each a small protuberance, in reality a miniature cam, which normally does no work. When, however, by means of the hand lever referred to, the camshaft is drawn

(Continued on page 26)



Bottom half of the base-chamber from above.



One of the cast steel cylinders.

Bronze tube enclosing the overhead camshaft.

FOREIGN NEWS

BELGIUM

Brussels was bombarded by a squadron of fifteen aeroplanes on September 6th. An eyewitness of the raid said he was sitting with friends in a hotel in the centre of the city when the squadron appeared. Anti-aircraft guns immediately went into action.

The aeroplanes were seen distinctly, he declared, and some flew so low that they seemed to touch the roof of the hotel, but their nationality was not made out. Guests in the upper rooms of the hotel fled downstairs.

Intermittent bomb explosions and firing continued until daybreak. One machine, he added, was reported to have been brought down in the outskirts of the city.

"This was the most important raid in a long while," he said. "Smaller affairs occur almost every other day. These frequent air visits by Entente aeroplanes hearten the Belgian people wonderfully and inevitably lead to exaggerated notions of the impending departure of the Germans."

FRANCE

The official report for September 5th follows:

"Aviation.—One of our aeroplanes which was attacked by four enemy machines succeeded in freeing itself from its opponents, one of which was subjected to machine gun fire at very close range and crashed to the ground in the Chaulnes district."

The French official statement for September 10th is as follows:

"On Saturday our airmen were engaged in forty combats over the enemy's lines, in the course of which the Germans suffered losses. On the Somme front Adjutant Dorme brought down his ninth aeroplane, which dropped at Beaulencourt, south of Bapaume. Four other German aircraft fell in a damaged condition, one in the region of Maisonette and the others north and east of Péronne.

"On the Verdun front an enemy aeroplane came under our machine gun fire at close range and fell to earth near Dieppe. Another fell on the German first lines near Vauquois, in the Argonne.

"On Saturday night one of our squadrons dropped 480 bombs on stations and enemy depots in the region of Chauny (south of St. Quentin). Several machines of this squadron made two flights from their aerodrome to places selected for bombardment.

"The same night eighteen of our machines dropped numerous bombs on the military establishments at Ham and in the region south of Péronne. Several fires were observed in the districts attacked."

GERMANY

Professor Siebert, several years ago exchange professor in the United States, was killed recently in an aerial action over the western front. The following day the Belgian victor dropped a bouquet of roses for the funeral with the inscription, "A Belgian aviator's homage to a foe defeated in an aero battle."

Captain Boelke, many times reported slain in aerial combat, has brought down his 22d aeroplane according to an official statement from Berlin on September 10th.

The following statement was issued on September 9th by the Admiralty:

"On September 6 our naval aeroplanes dropped bombs on hostile naval forces off Arensburg, on Oesel Island (in the Gulf of Riga). Near Zevel a hostile aeroplane was forced down.

"On the night of September 6 one of our naval aeroplanes dropped a large number of bombs, with good results, on the Russian aeroplane station at Runeo, on the Gulf of Riga.

"On September 7 a Russian gunboat bombarded the North Courland coast without success. It was pursued and bombed by naval aeroplanes.

"On the same day the Dutch steamship Niobe, with contraband, was brought in by our naval forces in the North Sea."

Saturday (via London).—The Courier, of Hanover, says the commander of the airship which was brought down in England during the raid of a week ago was Captain Schramm, a native of Hameln, Prussia. The captain received the iron cross of the first class for raids over Nancy, Dunkirk and England.

GREAT BRITAIN

A correspondent at the front with the Prussian Armies in telling of the Allied offensive on the Somme gives the information that the British Fliers are proving very efficient. His account follows:

The British artillery, so far as the correspondent has observed, and as he has been informed by officers, is shooting very well. The British aviators have been troublesome. They have not only helped the artillery immensely in observation, but have even co-operated with the infantry in storming attacks and in several instances they are reported to have swooped down upon the Prussian positions from the rear, using machine guns and bombs on the defenders from elevations as low as four or five hundred feeet.

In later reports of the last Zeppelin raid over England it has been brought out that the Zeppelin which fell in flames was brought down by the pilot of an aeroplane, Lieut. William Leefe Robinson. As is natural in such cases Robinson is now the idol of all England, and has been awarded the Victoria Cross and will probably be the recipient of the $12,500 fund raised by popular subscription for the first man to bring down a Zeppelin. His somewhat laconic account is as follows:

"I had been up something over an hour," he said, "when I saw the first Zeppelin. She was flying high, and I followed her, climbing to get a position above, but there was a heavy fog and she escaped me. I attacked her at long range, but she made off before I could see if I had done any damage.

"The next airship I saw I determined I would attack from the first available position. I met her just after 2 o'clock, flying at 10,000 feet. Soon she appeared to catch fire in her forward petrol tank, and the flames spread rapidly along her body as she made off eastward afire. In a few minutes she dipped by the nose and dived slowly, a mass of flames, to earth.

"I was so pleased that in my excitement I pulled the joy stick lever and looped the loop several times. Then I showed my signals and came back to earth."

It is thought in Great Britain that the recent Zeppelin raid was made partly to give impetus to the negotiations for the German loan of $105,000,000.

The following is the official report for September 5th:

"During September 3d hostile aircraft showed great activity and fighting in the air was continuous. The enemy's aircraft were forced to remain some miles in the rear of their own lines and entirely failed to interrupt the work of our machines. On two separate occasions our aeroplanes opened fire on the enemy's troops on the ground.

"As the result of many combats three hostile machines were brought down and seemingly wrecked. Many others were driven down in a damaged condition. One of our aeroplanes destroyed a hostile kite balloon. Two of our machines are missing."

The site on the hillside at Cuffley, where Lieutenant William Leefe Robinson of the Royal Flying Corps brought down a Zeppelin during the German raid of Saturday night, has been presented to the nation by its owner, Mrs. Kidston.

The gift is made with the understanding that a suitable monument shall be erected by public subscription on the spot where the Zeppelin fell.

The official report for September 7th follows:

"On Tuesday two of our aeroplanes raided the Turkish aerodrome and aeroplane repair station at El Arish. Twelve bombs were dropped, apparently with good results.

"Enemy aeroplanes attacked our machines, but did not close in, only opening fire at long range. They ultimately gave up the fight. Our machines returned undamaged."

Recently a sufficiently guarded description revealed the fact that Britain possessed a new class of airship comparable to some extent with the German Zeppelin. Neutral captains, it is said, arriving at certain east coast ports are enthusiastic in their admiration of the new airships. In their opinion the British model is far more readily handled and altogether less cumbersome than the German craft.

The difficulties which lay in the way of competing with the type of airship which is the result of Count Zeppelin's life work were serious.

The small dirigible was not difficult to construct, and some time ago Great Britain was thoroughly supplied with that type. The large dirigible, corresponding to the Zeppelin, was a much more difficult thing to build, as it involved problems of aerostatics with which British constructors had little experience, and the fact that France, with all her aeronautical experience, which included the pioneer work on this subject, had not seen fit to create a Zeppelin fleet, indicated very clearly the difficulties in the way.

But it was Britain's business, for the real value of the great dirigible is its service for the fleet, and the naval problem is of course essentially hers. The problem to be solved involved questions of new forms of valve, new kinds of dope, new methods of welding and structure, and the acquiring of sufficient quantities of aluminium, which happily did not prove very difficult. The further work to be tackled was the creation of air sheds to accommodate such monsters, and this involved an amount of labor and material on a vast scale.

However, the difficulties have been overcome and the airships are built and ready. It will be a pity if the public jumps to the conclusion that Britain has now a new war arm with which to meet the Zeppelin raids. Zeppelin can no more fight with Zeppelin than submarine with submarine. British Zeppelins have other work, and that the most vital work for England that can be done. They are the eyes of the fleet.

HOLLAND

According to the Maestricht Les Nouvelles, a German monoplane, after being hit in the wings and the gasoline tank by bullets by Dutch soldiers while flying over Dutch territory landed in the Dutch village of Roosterin. The aviator was not injured and he and his machine were interned. The paper says that the aviator probably lost his way while on a reconaissance.

ITALY

The following is the official report for September 5th:

"On the Middle Isonzo and the Carso there was only intermittent artillery activity. Our batteries destroyed a captive balloon near Sela Selo.

"Sunday evening hostile aircraft dropped bombs on Mariano, and yesterday evening on Lucinico, Sdraussina and Gorizia. Three dead and some wounded are reported in Gorizia. The roof of the Church of St. John was seriously damaged. A seaplane squadron Monday night dropped twenty bombs on Venice, but did no damage."

JAPAN

In the estimates of the War Office for the next fiscal year the appropriation for the Aviation Corps is one million yen, an increase of 400,000 yen compared with the current fiscal year. With this additional outlay the War Department will build about ten aeroplanes, some sheds and another aviation ground in addition to the one at Tokorozawa.

RUSSIA

Owing to the favorable weather, says the Overseas News Agency, there has been lively flying activity along the Russian front in Northern Courland and at the entrance to the Gulf of Riga.

The Russian aerodrome at Arensburg, on the Island of Oesel, in the Gulf of Riga, was successfully attacked, the agency says, by Prussian hydro-aeroplanes. Attacks attempted by Russian aviators on the Courland coast were frustrated by Prussian hydro-aeroplanes and anti-aircraft guns. Several bombs fell into the sea or into the forest without damage. One Russian aeroplane was disabled by anti-aircraft guns.

MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz

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MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Aero Science Club of America

Due to inclement weather and the fact that many of the members of the club were away on their vacations, the past two contests of the National Model Aeroplane Competition were not as satisfactory as was anticipated.

The R. O. G. rubber strand contest was held at Church avenue, Brooklyn, N. Y., on July 20th, the record of the day being 1,620 feet established by Mr. C. W. Meyers.

The R. O. G. mechanical driven model contest was postponed three times on account of inclement weather. The final meet was held August 31st at the Sheepshead Bay Speedway during which contest two excellent flights were made by Mr. F. C. Thiele. On the first flight the model flew a distance of 230 feet and on the second 145 feet. The machine used in this contest is of entirely new design, the motor being powerful enough as to enable the model to fly in a gale of 30 m.p.h.

While the models used in previous contests were of the pusher type, this model was of tractor design and flew quite well. The span of the wings is 4½ feet with a cord of 10 inches. The length over all is 31 inches. The power plant consists of a 3-cylinder motor of the no valve type and drives a 14½-inch propeller. The total weight of the model is 31 ounces.

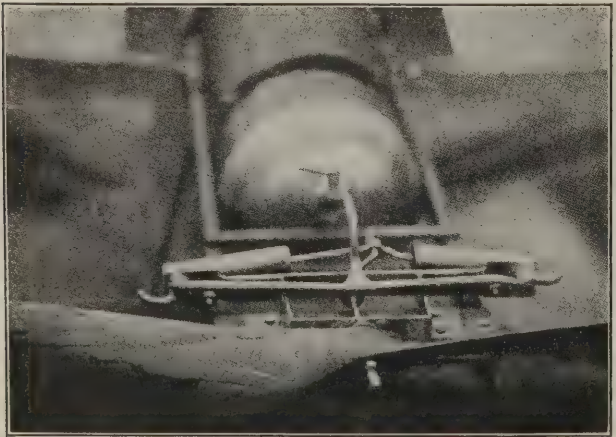
Mr. C. W. Meyers, of Glen Ridge, N. J., informs the club that he expects to try out his full size biplane. The machine is of the Curtiss headless type and looks very neat and promising. Several other members of the club will start work on a man-carrying machine this winter.

Aero Science Club

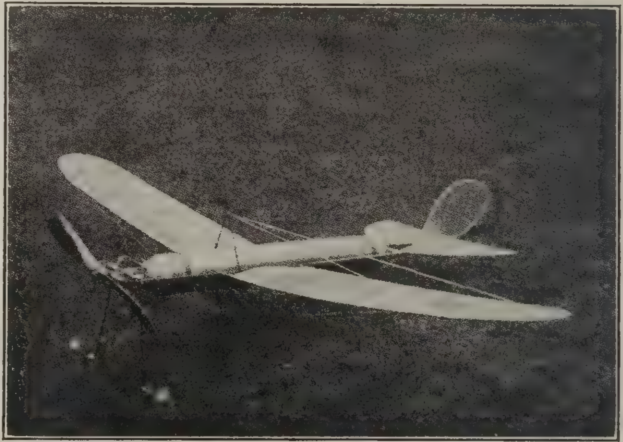
The Thursday meetings of the officers have proven a great success. At the past meeting it was decided to revise the Constitution and By-Laws. The new forms of both will be published shortly.

Members in the vicinity of New York who desire to participate in the September contests will kindly inform the club. A few vacancies are still open.

At the meeting of September 9th it was decided to hold the contest for power-driven models on September 17th on the Glen Ridge golf links. The September competition for rubber band models will take place Sunday the 24th on the old Mineola field. Contestants will be in both meets: Mr. Charles Myers, Egbert Lott, George Cavanagh, John McMahon, Ellis Conklin and Fred. C. Thiele.



A two-cylinder opposed compressed air motor designed and constructed in England.—Courtesy Flight.



The same motor used in a tractor type model the design of which is similar to that used in America.—Courtesy Flight.

Illinois Model Aero Club News

By D. W. Pease

On Sunday, June 20th, the Illinois Model Aero Club held a meet for "amateurs" in which only those could enter who had never won a prize before. The first prize is a silver cup offered by the club and second, third and fourth prizes have been offered. A series of four meets is to be run off for these prizes and a fifth meet is to be held for a ride offered by E. M. Laird, former president of the club. The first meet has already been held and the competition promises to be a complete success.

At the club meeting of September 1, D. W. Pease, secretary of the club, resigned his position and Donovan Lathrop was elected to fill his place. William Sprague, Jr., was elected chairman of the contest committee upon Mr. Thomas Hall's resignation. These two officers of the club were compelled to resign on account of their attending school this fall, Mr. Pease at the University of Illinois and Mr. Hall at the Armour Institute of Technology.

Rigid Versus Flexible Trailing Edge

The writer recently experimented with rigid and flexible trailing edges, with the following results:

"The first experiment was carried out with a plane having a rigid trailing edge; when this plane was flying at a good altitude the tail plane was struck underneath by a gust, the result being a sudden dive to earth; during another flight the tail plane was struck by a gust on top which caused the model to stall badly and then sideslip to earth.

"The second experiment was carried out with a main plane the same size as that used in my first, but with a flexible trailing edge. When this plane was struck by a gust on the underside of tail, instead of diving to earth it dipped slightly and then recovered. I attribute this to the fact that when the tail was struck on the underside the flexible edge of main plane was also struck and flexed upwards, and so acted as an elevator, causing the head of model to come up quickly after a small dip. I repeated this experiment several times, with the same result. When the tail plane was struck by a gust on top, the model lifted its head slightly and then flew on an even keel; no doubt this was due to the elevator effect of the flexible trailing edge of main plane."

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Flight!

Many of us are prone to go
With flighty thoughts from earth below
To heavens high of azure blue.
Are wont to soar and soar and soar:
Of this cold globe we want no more.
There in the clouds we calmly sit,
Watching Old Earth beneath us flit.
But our ascension lasts not long,
Our flight is but one short, sweet song.
We drop to earth with one dull thud.
Dust unto dust—from clouds to mud!

—E. M. H.

"I hear Blink and his pilot had a quarrel in the air."
"Oh, just a little falling out."

An Aid to Joke Writers

It has always been considered by some writers for the various papers in this country that there is something ludicrous about the aeroplane. Why this is the case we do not know, but honestly we feel sorry for the man who is ordered by his boss to sit down and fill a page in a few minutes with jokes and stories which must cause the simple-minded public to gasp and gurgle in spasmodic amusement. We are willing to risk almost anything that the lunatic asylums are almost wholly filled with those poor individuals, who by nature are more fitted to write summaries of funerals, deaths, and weddings, but are forced by circumstances to sit up into the still small hours of the night racking their brains for something comical. Now just *what* is there funny about an aeroplane? We are in the above predicament—have been commanded to fill a page with material which *must* be funny. And before we go on our merry way to the county insane asylum we are going to do a service to the joke writers of this country by establishing once and for all the humorous points of the aeroplane. We shall leave out everything which has been used before and just present to those unfortunate individuals the meat—the *essence* of the humorous.

In the first place there is nothing so absolutely laugh-inspiring as a picture of an aeroplane hurtling to the ground with its pilot grinning and remarking, "Well, I was about to come down anyway." Why this is so funny we shall not attempt to explain. The poor man is about to break his neck—he knows it, you know it—we all know it, but still there is something indescribably funny about it. Maybe it is because we can imagine the dull thud with which he is about to land! Then again a carefully drawn picture of a balloon passing over head and a bag of sand dropped from it about to land on the head of some man walking in all serenity. Gosh, that is funny! Just look at the poor fool—there he is, happy and contented walking along the streets and in a second he is going to be utterly ruined by a bag of sand. (Excuse us while we howl with merriment.)

In this connection we might remark that the more dignified the man appears, the funnier the effect. A frock coat and a high hat will heighten the effect wonderfully. And if we can show by our illustration that the poor unfortunate is a minister—Ah me, what mirth! But taken all in all the best of all is an illustration of an aviator, having fallen from his craft, about to land on the cold, unyielding earth on the seat of his new trousers. A caption such as "The whole world against him" will improve the picture immeasurably. Finally, a picture of a dirigible going by above with an anchor (by the way, who *ever saw* a flying machine with an anchor?), plucking some man from the midst of his labors in the field. Of course the anchor must be affixed to the man's trousers; if it should take him by his coat or his collar it would not be nearly so funny.

(Editor's note. At this point the manuscript becomes rambling and incoherent. The deserving young man who is responsible for it disappeared from sight and after a long search he was found in a well-known rest for the mentally incompetant. With tears in his eyes, the man who was sent, listened to his ramblings. They sounded somewhat like the following: "Har Har, jokes, aeroplanes; more material, aeronitis.—must have a full page,—be sure it's funny—your last stuff was terrible—be careful, you will lose your job, Har har!" Let us draw the curtain on this terrible scene.)

Such Is Fame in Hammondsport

(An advertisement in a daily paper.)

Try the Curtiss Pony Aviator and the America's Aviator—both the best five-cent cigars on the market. If your dealers don't sell them tell them to get a supply from Van McCorn, Hammondsport. He keeps them in stock. If the dealer won't get them, buy a box of McCorn.

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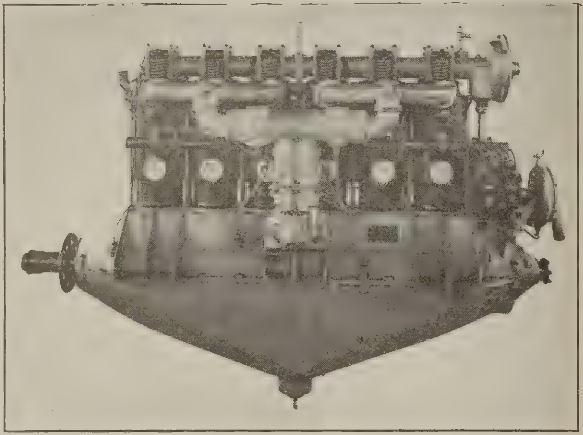

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Three World's Records made by Floyd Smith, with Martin Seaplanes, comprising 1st, Aero Squadron for the Philippines, 12,362′ altitude with one passenger, 9,544′ with two passengers, 9,603′ with three passengers. Corporal Smith holds American Duration Record of 8 Hr. 40 Min. De Lloyd Thompson, with passenger in Day Military Tractor climbed 13,950′.

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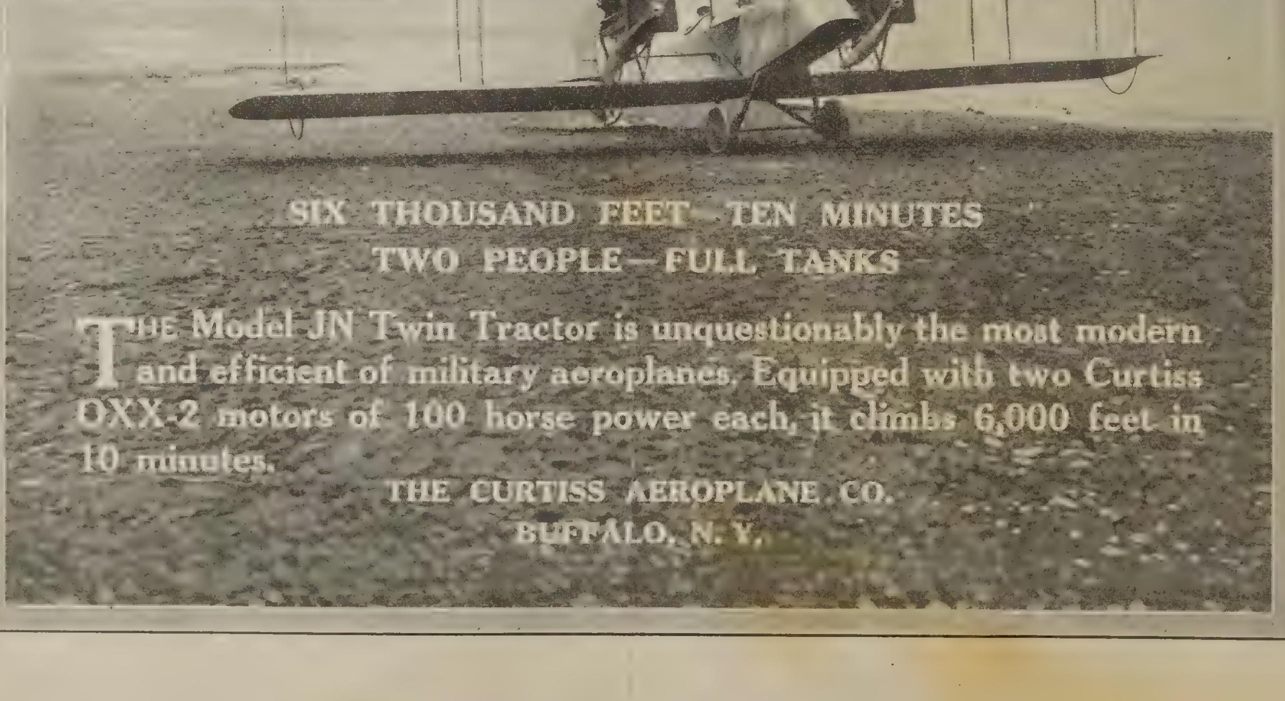

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THE CURTISS AEROPLANE CO.
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Ashburn News

Flying at the Ashburn Aviation Field has continued with great activity. Instruction flights have been made daily by the students and instructors of the Stinson school. On August 20, Robert Schenk completed his course of instruction on his own machine, a Stupar tractor, and made his first flight alone. The thriller of the week was furnished by Schenk, when accompanied by Miss Loretta Johnson, he made a perfect flight in his Stupar. Miss Johnson was immediately "converted" as was her father who calmly witnessed the proceeding. Two other students will soon be ready for their license tests.

Miss Marjorie Stinson recently made her first flight in a tractor, the 50 H. P. Brock, and flew it perfectly the first time in spite of the fact that she is used to the Wrights with their stately pace. She has been doing a great deal of practice work since then preparatory to the exhibition season. Her first date is in Napoleon, Ohio, and from there she ships to Cleveland, Ohio. Her brother, Edward, has just completed a duplicate of this machine and will soon leave for an exhibition tour in the South. Miss Katherine Stinson has been flying on exhibitions in various parts of the country, and is at present flying in Worcester, Mass. Her plane and 80 H. P. monosoupape Gnome motor recently received a thorough overhauling in preparation for the exhibition season.

Laird also has been preparing by overhauling and cleaning up his little looper and building extra parts. He has made several fine flights in Arens's new tractor, putting it through its paces in fine style. He has done everything with it but the loop; but its most remarkable maneuver is a quick turn. Some people actually believe Laird could fly it into a hangar, turn around, and come out again without touching anything. Laird recently gave his little tractor with the motorcycle motor another tryout. It rises in about 75 feet and climbs rapidly. Laird left for Bay City, Mich., on a hurry call for exhibition work, thence en route to Springfield.

Wm. Couch, the Stupar flyer, tried his wings on Labor Day, after making thirty-seven flights throughout the week, thus becoming the busiest pilot on the field. William A. Christianson recently brought out another Stupar equipped with a 50 H. P. Gnome and it was given its tryout with Frank Champion, the well-known Bleriot flier at the controls. Still another Stupar appeared when Ray Carrol, of the Stupar factory, brought out a little machine equipped with a De Lux motorcycle motor.

Frank Kastori has been flying the P. L. V. in daily instruction flights. Since there is such a demand for aviators for exhibition flying, E. T. Partridge has decided to postpone school work for a while and fly exhibitions with his rebuilt tractor. Walter T. Brock, the well-known cross-country pilot, is building a Morane-Saulnier type monoplane and reports that he expects to be out with it in about a month.

Happy Sinclair, another Stupar pilot did remarkable work during the week-end. Aviator Hoover has completed his 100 H. P. tractor with the assistance of Fred E. Goodall, the old reliable designer and inventor.

Three new double hangars have recently been erected in addition to the seven now completed, and more are in course of construction.

The Aero Patrol of the Coast Guard

Captain E. P. Bertoff, head of the Coast Guard Service, in an interview with a representative of Aerial Age said that they proposed to go slowly in the matter of training men for the Coast Guard Service because they were expected to be ready in any emergency, and they had to take what means were at hand and get results. He said their ships may not be as good as the regular navy, but they were doing the work and were getting results. Captain Bertoff was anxious to find the best schools in the country where his men could be trained and he was anxious to have the men grounded in the elements of aeronautics as deeply as possible.

We are blamed by the public when we are not ready in an emergency, for they rely on us at all times. We have the best seamen as navigators in the Government Service and intend to make the aeronautical branch of this service just as reliable and dependable. Captain Benjamin Chiswell, now commanding the Coast Guard Cutter Onondaga, stationed at Newport News, has been very enthusiastic in regard to the use of aeroplanes in the Coast Guard and will probably be appointed to organize this branch of the Coast Guard Service.

Lieutenant Norman B. Hall and Lieutenant of Engineers Charles E. Sugden are at Pensacola receiving training at the Naval Training School. There are altogether about 4,000 men in the Coast Guard Service, and we have stations in Alaska and Porto Rico, where we could establish aeroplane service. We expect to spend about $60,000 for machines and want the most seaworthy and air worthy type that we can procure.

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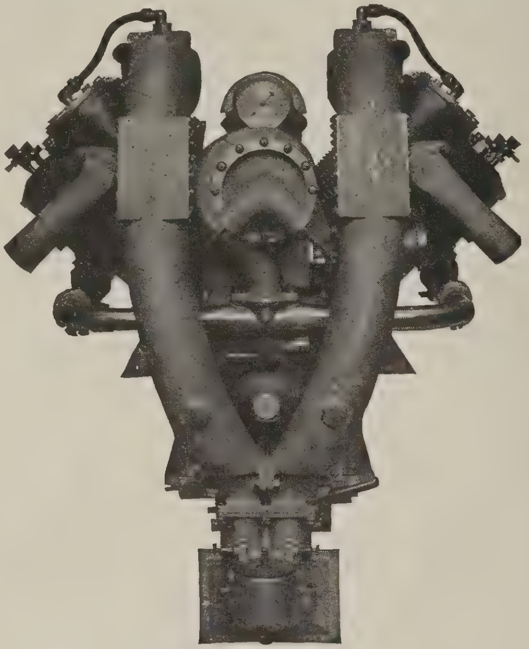
A Question of Responsibility



You who are about to purchase Aeroplane Motors, have you considered the question of responsibility?

Are you satisfied to buy motors, one part of which is manufactured by A, another part by B, another part by C, another part by D, and the motor finally assembled by E? All parts of

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And All Principal Cities of the World

Hon. Byron R. Newton Indorses Aero Patrol for Coast Guard

Mr. Byron R. Newton, Assistant Secretary of the Treasury, commenting on the aeronautical stations of the Coast Guard to a representative of Aerial Age, said that the Coast Guard was one of the most important branches of the Government service, although less frequently mentioned than many of the others.

The Coast Guard is responsible for the locating of ice flows and icebergs which are constantly changing and a menace to commerce on the high seas. It is also responsible for the locating and the destroying of derelicts which are drifting about in the paths of vessels, and when located it is of the utmost importance to get immediate word of them because their position is rapidly changing and it is exceedingly difficult to find them after having been reported if considerable time has elapsed. In this respect the aeroplane would bring the information in the quickest possible time and obviate the difficulties of a long search before picking them up.

Another most important function of the Coast Guard, and the one which is most generally known, is the life-saving service and the assistance rendered to ships in distress. An aeroplane service for this purpose would have to be ready when an emergency called at any moment prepared to meet the circumstances that might exist. There are many cases where ships are out of reach of the guns which carry lines from the shore and when the sea is running too high for a lifeboat to live. There is a calm after every storm as well as before it, and, although the sea may be high, the wind may not be too strong for the modern high powered air cruisers to fly off shore and carry lines and assistance to those in imminent danger of a wreck that is being broken up by the sea.

The first station will probably be established near Newport News, Va., and a second one near Cape Hatteras, and others about sixty miles apart along this part of the coast where the storms are most severe.

Alloys Used in Zeppelin Construction

According to the *Revue des Produits Chimiques*, a French publication, analysis of a Zeppelin airship recently brought down in France showed the following constituents: Aluminum, 90.27 per cent in angle brackets, 88.68 per cent in channel members, and 99.07 per cent in the bracings; zinc, 7.80 per cent in angle brackets, 9.10 per cent in channel sections, and 0.13 per cent in braces. The rest of the constituents, obviously of small amount, numbered copper, tin, manganese, iron, nickel and silicon. Magnesium, hitherto accounted a constituent in aluminum, appears to have been carefully excluded. Only a trace of nickel is reported.

Had Flyers Ready for Distribution of Hearst Films

The International Film Service, Inc., was fully prepared to protect its patrons had the railroad strike not been called off. It had completed arrangements with Captain Thomas F. Baldwin, president of the Atlantic Coast Aeronautical Station, for an aerial transportation line between New York and Chicago.

It was arranged that the weekly motion picture release of the International Film Service, Inc., would be sent to Chicago and intermediate cities by aeroplane. If the situation had made it necessary the films would have been carried to St. Louis by speedy fliers.

Captain Baldwin agreed to hold in readiness his three crack fliers, Victor Vernon, Victor Carlstrom and Johnston, the sensational Californian. He also held for immediate use, one of the famous Curtiss twin-tractor aeroplanes, capable of making from 90 to 100 miles an hour. The twin-tractor could carry any weight that might be necessary to transport the motion picture films to the West.

Personal Paragraphs

Ruth Law will make exhibition flights at International Wheat Show at Wichita, October 2-14.

Harry H. Metcalf, one of the Harvard students at Buffalo, is the first of the group of Harvard students to qualify for his pilot's license.

André Houpert, a French aviator, flying a machine of his own construction, has been covering the fairs in the Missouri region during the past week.

"Dare Devil" Charles T. Mills flew at the Freeborn County Fair, Minn., September 13-15.

(*Continued from page* 10)

had more trained men in their aviation corps than we had men in the whole United States army.

The chairman introduced the speaker of the day, John T. McCutcheon, as the man who, being the best, was saved for the last. We all know of the famous cartoonist and war correspondent, but all of us did not know that he had the unique experience of flying on the German and French fronts and also at Saloniki. First, last and all the time, John T. is a regular fellow, a real two fisted, red blooded man that every other real man likes at once.

John T. McCutcheon said a lot. Among other good things he told about dining with the chief of staff on the German front. Remarking to one of the officers of his desire to fly, he was, to his great delight and astonishment, given the opportunity the next day. He went up in a biplane with one of the best known German military aviators, the first civilian to fly along the war front in the greatest war in history. He was up about 10,000 feet and the lines of trenches, the reserves massed behind the whole battle front for miles were pictured before him.

Mr. McCutcheon later flew on the French front and also flew 25 miles in a small, fast monoplane, from Paris to a suburb. The aviator was delivering the monoplane to the French authorities and made no more fuss about it than if driving an auto. Here again the whole country was a series of huge, beautiful moving pictures.

At Saloniki he went up twice in different machines, where he had a view over the gulf on one side and could see far in the distance the boundaries of what was once Servia and the trenches of the Allies and the Bulgars, Turks and Germans.

Mr. McCutcheon is a believer in aviation and in preparedness. He believes that we are criminally careless in not getting thousands of men trained for the air. After listening to his personal experiences, one feels that the romance of war may be buried in the trenches, but is born anew in the air. Many of the things he saw abroad and was told about he was in honor bound not to tell of, but the listeners felt that much remained to be told. That in a few years thousands would fly right here in Chicago was Mr. McCutcheon's belief, as it is also his feeling that the experience of flying is the most wonderful feeling that one can have on this earth.

It has seldom been the privilege of the average man to listen to so much history in the making nor be so near a real change in transportation methods and military methods. Seldom have we had so many distinguished personages at our speakers' table. It was certainly fine to be able to have Captain Morrow with us at this critical time in Chicago's aviation history.

At the aviators' table, among others were Louis Gertson, who loops the loop at Lincoln Park most every night; Harry Wells, Emile Laird, products of the Junior Aero Model Club, now full fledged aviators; F. X. Mudd, of the good roads committee of the Auto Club, and Darwin Hatch of *Motor Age*.

If President Woodrow Wilson could only have been at our club he would be sure that Chicago's advertising men were all in favor of aviation.

August 15 will be a red letter day in the history of the Advertising Association, the livest and most patriotic club in Chicago, and in a few years when aeroplanes will be more numerous than autos, it will be an event to tell our children about.

(*Continued from page* 11)

the back of the propeller. The back of the propeller has just as much to do with its efficiency as the front.

We are conducting careful experiments at the present time on our factory test stands, and under actual flying conditions, attempting to determine the most efficient curve for the back of the propeller as well as the front.

We believe a standard method of mounting the propeller should be adopted by army and navy circles, and understand that they have already attempted to reach a decision in this matter. We have submitted our method of propeller mounting to Washington officials. Proper propeller mounting is quite a severe problem, especially when high powered engines are taken into consideration. It is a most difficult matter to properly hold the propeller flanges on the end of crank shaft, and at the same time have such a design as will allow of easy removal of the propeller.

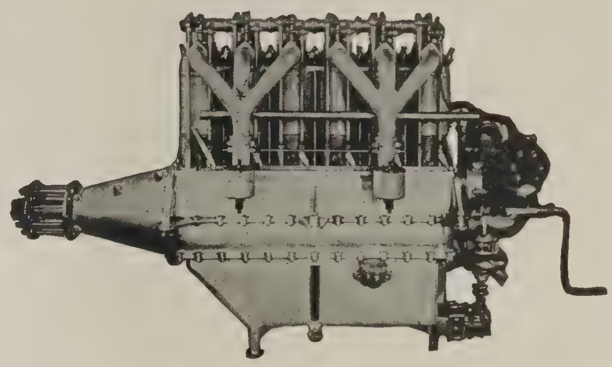
Yours very truly,
HALL-SCOTT MOTOR CAR CO., INC.,
B. C. SCOTT, Pres.

Wood the Important Element

BY C. B. KIRKHAM

Your letter of the 4th inst. is at hand. It is impossible to say at the present time what is the correct design for the propellers which are to be used on the next order.

WHEN YOU BUY AN AEROMARINE YOU BUY THE BEST



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of **eight continuous hours** at full load and speed **have proven beyond question** the **reliability** and **durability** of

THOMAS

135 H.P. Aeromotors

Three motors recently taken from production **without special preparation** have successfully passed their **United States Government tests.** Prospective purchasers desiring a similar test will be cordially accommodated.

Thomas Aeromotor Co., Inc.

ITHACA, N. Y.

Our experience, however, seems to show that one of the principal requirements is the wood that is used in the propeller shall be very thoroughly seasoned before being made into the blade and the blades themselves given plenty of time in the course of manufacture so that any strain set up by the gluing process can adjust itself.

As regard the type of propeller: this depends largely upon the size of the motor on which the propellers are to be used, as we find that the design of the propeller that is suitable for a 100 H. P. motor is entirely unsuited for a 200 H. P. motor.

We do not feel that at the present time there is sufficient knowledge of the action of climate in the border service to say that we know the best design for this service.

Yours very truly,
Curtiss Aeroplane and Motor Corporation,
C. B. Kirkham, Chief Engineer.

(*Continued from page* 18)

to its limit of movement toward the rear, this small cam is brought into line with the roller end of the exhaust valve rocker, and so gives a slight lift to the valve as the shaft rotates. Its position on the main cam is such that it is timed to operate the rocker and so depress the valve at the moment when the piston of that cylinder is nearing the end of the compression stroke, and thus a certain portion of the charge is allowed to escape. In this way the work of swinging the propeller is eased, and moreover, the engine can, by the aid of this device, "idle" more slowly and smoothly. Obviously the cam faces are of such width that they are able to engage the rocking arms whatever the fore and aft position of the shaft as a whole, and just as obviously the small cam in no way interferes with the functioning of the large cam of which it is an excruescence.

All parts of the engine are supplied with oil under pressure from a pump contained in the base chamber and driven by the second or lower vertical shaft from the crankshaft bevel. The pump unit, which includes this vertical shaft and its bevel, may be bodily removed from the base of the crank chamber by extracting a few bolts. Its general appearance will be seen from one of the accompanying illustrations (Figure 4) which shows that the main shaft drives by means of a worm or horizontal shaft carried in two standards on the base plate. Worm wheel, shaft and its four eccentrics are cut from a single bronze casting, which is drilled through from end to end to receive the steel spindle on which it rotates. Steel straps encircle the eccentrics and actuate four pistons, two of which are pumps and two merely valves.

It would seem the two pumps are necessary on account of the peculiar construction of the crankcase—in which it will be remembered the sump is in two parts—since when the original oil level has fallen and the machine is in such attitude that all the oil flows to one or the other of the compartments, the pump might not be able to receive oil. For this reason, one pump is in communication with the front compartment and the other with that in the rear.

In principle the carburetor employed is of the very simplest type, consisting of two flat chambers, two jets, two coned-choke tubes, and two cylindrical throttle valves, all but the first named being incased in an aluminum casting in which a water jacket is in shunt with the main cooling circuit. The two cylindrical throttles are, of course, coupled up with one another, so as to operate simultaneously and equally, and with the exception of the air intake, to which reference has already been made, there is nothing more of interest, at any rate, to be said of the carburetor, other than that three cylinders are supplied by each jet.

The two magnetos, Bosch, Z. H., 6 type, each control a set of six plugs, of which there are thus two per cylinder, spaced approximately opposite one another in the cylinder walls and passing through the jacket. They are of course supplied with means for hand-timing synchronously.

Every part, component and auxiliary, having been described more or less fully, it now merely remains to give one or two particulars that have not so far been touched upon. Having a piston displacement of 2,463 cc. per cylinder and a compression space of 700 cc. per cylinder, that is a total capacity of 3,160 cc. per cylinder, the compression ratio is 4.52 to 1. The total weight of the engine without radiators or water tank is 595 lbs. 2 oz., which gives a weight power ratio of approxiately 3¾ lbs. per horsepower, a figure somewhat surprising in view of its robustness. It must be remembered that to this another 160 lbs. at least must be added for the weight of the radiator, tank, piping and water.

The 100 h.p. Mercedes, which had a piston displacement of 9,500 cc., as against 14,778 cc. for the 160 h.p., was known to possess a B. H. P. of 87.7 at 1,200 r.p.m., so that if the proportion holds good the B. H. P. of the engine now under consideration is in the neighborhood of 136.4 and the weight per h.p. on this showing would be more nearly 5.6 pounds.

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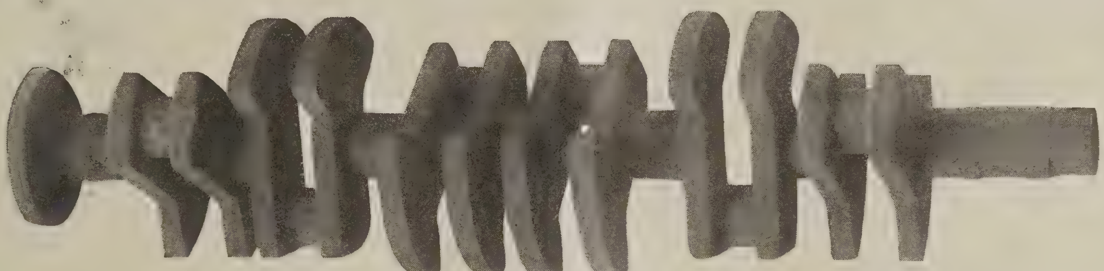

THE PARK DROP FORGE COMPANY, Cleveland

Otto Praeger Discusses Aeroplane Mail

Mr. Otto Praeger, Second Assistant Postmaster General, in an interview with a representative of Aerial Age in regard to carrying mails by aeroplane, showed the recommendations and memoranda of changes that would be effected in the mail delivery of Alaska if the bid of $49,500 of Mr. E. L. Byers for carrying mail by aeroplane from Seward to Iditeroud were accepted.

This would deliver mail twice a week over a route 380 miles long from Seward through Knit, Susitna, McGrath, Tokotna Flat to Iditeroud at a cost of 62.6 cents a mile and 23.3 cents a pound, as against the present rate of 81.1 cents a mile and 92.5 cents a pound. By steamer and roads the route is 526 miles. A total reduction of $106,466 would be made in the cost of mail delivery besides establishing a new distributing point. This would necessitate an increase of $71,908 in other routes, making a net saving of $34,558 if the aeroplane route is put through. In addition to the saving in cost the time in winter between Seward via Cordova, Fairbanks to Nome is 39 days and by Seward, Iditeroud, Kaltiz to Nome, the aeroplane route, 18 days—a clear saving of 21 days in time, bringing practically all of the region around Nome three weeks nearer civilization.

Ernest Schelling Makes Flight

Mr. Ernest Schelling, pianist, took a chance with his one life and his ten precious fingers September 9, and made his first ascension in a hydroaeroplane with Lieutenant Patrick N. L. Bellinger, of the battleship North Carolina, now at Newport. They scudded out to sea for three miles, rose to a height of two hunderd feet and flew safely home over choppy waves.

Joe Boquel was the means of attracting over 200,000 people to Seal Beach, Cal., during last week, according to an estimate furnished by the authorities.

Boquel's flights have varied considerably, it being the proud boast of Seal Beachers that no two of his sky trips are alike, and that he furnishes new thrills twice every day.

Knits Socks While Flying Over City

San Diego, Cal., September 5.—Knitting socks for soldiers while riding in an aeroplane. That's what Miss Laura M. Anderson, of Montreal, did at San Diego, September 5, when she made a flight over the harbor and Exposition grounds with Aviator O. S. T. Meyerhoffer. When she received an invitation to fly with Meyerhoffer she accepted on condition that she take her knitting along.

"Why, certainly," agreed Meyerhoffer, "don't let me interfere with your knitting."

So the young woman calmly knitted away while the aeroplane soared over the city.

An Australian Airship

G. B. H. Austin, an Australian engineer, has invented an airship which will, he claims, be superior to the Zeppelin in action. It is an automatic balancing machine, and its planes act as girders and serve the purpose of a parachute when a descent is made. It is asserted that it will lift greater weights in proportion to its size than aircraft in present use, and will carry guns of longer range. A suspended car will serve to give the guns a steady platform. Trials have been made with a model of the machine equipped with a 12-horse-power engine. Carrying a weight of 380 pounds, the model flew to a height of 250 feet for various distances up to a mile without the aid of a pilot, the distance to be covered being regulated by a clockwork attachment connected with the engine. In every case the model landed safely "on all fours." It is claimed that the full sized machine will be able to carry a weight of 15 tons, including the engines, and will be equipped with two long range guns at each end of the platform. It is estimated that an engine of 1,000 horse-power will be needed to drive the machine. A company is being formed to build a full sized machine and offer it to the British Government to be tested.

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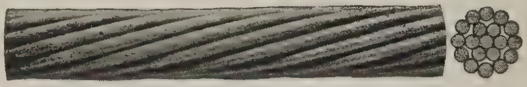
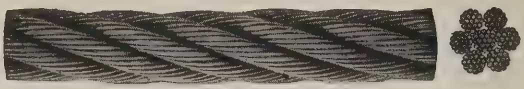
STRAND AND CORD FOR AEROPLANES
AND OTHER AIRCRAFT



Roebling 19 Wire Strand



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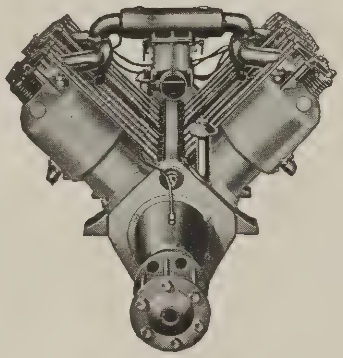

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Outfit consists of 2 Head Caps, 2 Receivers for each user, light-weight Battery and Cords. Weight complete, 5 lbs. 5 ozs. Receivers Adjustable to any type of headgear.

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WANTED: LICENSED AVIATOR OR ONE experienced in exhibition work. State all in first letter including salary or percent of exhibition contracts expected. Box 273, Wheeling, W. Va.

BRAND NEW TRACTOR BIPLANE FOR sale or trade for motor. Art Roza, 1517 So. Harding Avenue, Chicago, Ill.

LARGE, SEMI-FARMAN TYPE, UNUSED biplane $275. Bleriot parts $175. Used 7, 7½ and 8 ft. propellers $20. Patterson, 1950 East Jefferson, Detroit, Michigan.

INTERESTED IN AERONAUTICS? IF SO, why not join a progressive Club. Be associated with those who possess expert knowledge on the construction and flying of model aircraft and aviation in general. Write for information. Aero Science Club of America, Secretary, Engineers Building, 29 West 39th Street, New York City.

FOR SALE: TRACTOR BIPLANE SUITABLE for 75 H.P. motor. Good condition. Bargain if taken immediately. J. P. Thompson, 266 Fairview Street, New Britain, Conn.

FOR SALE: ROBERTS 4 X 1916 MOTOR and Excelsior propeller for same. All new. Price $475. P. H. Spencer, 456 Washington Street, Hartford, Conn.

YOUNG MAN WHO WISHES TO LOOP THE Loop, wants party who will finance and act as manager. Any reasonable terms. Box 96, Aerial Age, Foster Building, Madison Avenue and Fortieth Street, New York City.

PRACTICAL EXPERIENCED AEROPLANE builder seeks position with some reliable party or company as superintendent of construction work. Six years' experience. Address E. A. Room 969, 215 West 23rd Street, New York City.

MY $7,000 GENUINE CURTISS FLYING boat model F and $1000 equipment for sale for $3000. Cash. Can demonstrate at Chicago. Jack Vilas Woodruff, Wisconsin.

LICENSED AVIATOR FLYING LAND OR water machines wishes position; will do exhibition or any kind of flying. Go anywhere. Can furnish best of references. E. C. C., Apt. 39, 439 Jones Street, San Francisco, California.

TO AEROPLANE CONSTRUCTORS: PATtents No. 1,177,382 and 1,190,248, also pending patent, Serial No. 93068, improvement on No. 1,177,382. Reasonable terms for immediate sale. Address D. F. Cashman, 338 West 4th Street, Dayton, Ohio.

FOR SALE: EXHIBITION LOOPING BIplane, no motor, 45 H. P. radial motor, 40-50 H. P. Maximotor, 60 H. P. maximotor. 553 S. Broadway, Dayton, Ohio.

WELL EDUCATED YOUNG MAN, SIX years' experience gasoline motors, desires financial aid to become aviator, will give personal service or good security in return. Box 90, Aerial Age, Foster Bldg., Madison Ave. and Fortieth St., New York City.

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GLENN MARTIN TRACTOR FOR SALE. 90 H.P. Maximotor, Bargain. See us for Stupar Tractors, aero supplies or plans. Chicago Aero Works, 345 River Street, Chicago, Illinois.

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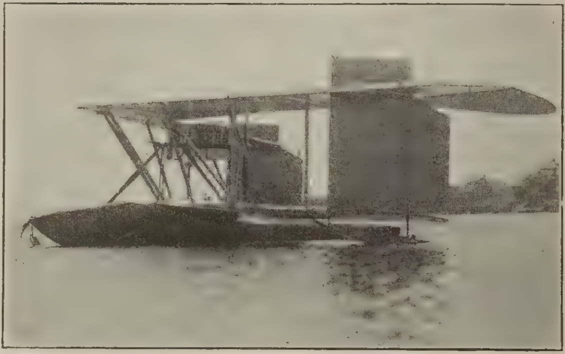
ANNOUNCEMENT

BURGESS FLYING BOAT



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The construction is worked out with a nicety of detail which must be seen to be appreciated.

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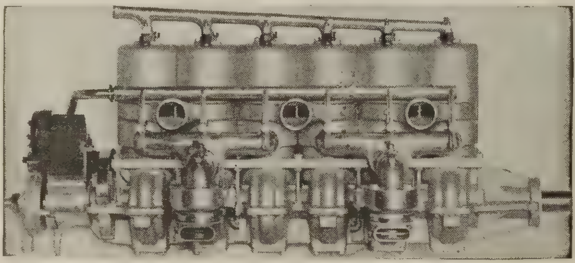

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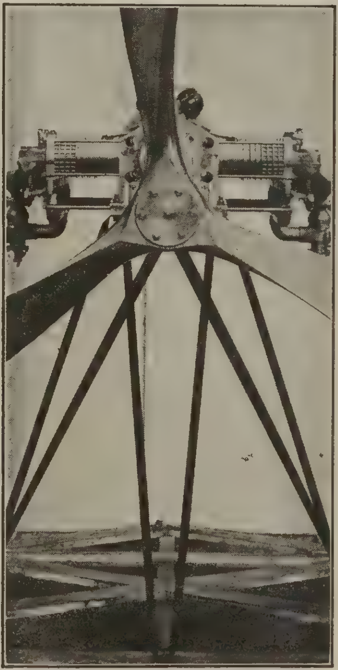

This photograph clearly indicates the small amount of head resistance of the entire power plant of the improved ASHMUSEN 12-cylinder, 105 H. P. self-cooled aeronautical motor as mounted on one type of standard.

Our new modern manufacturing plant is now producing these motors and the 8-cylinder, 70 H. P. motors exclusively and regularly.

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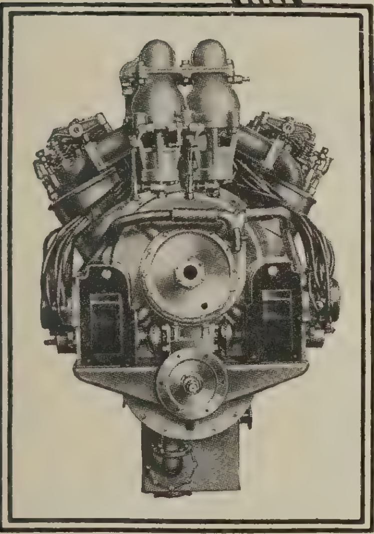
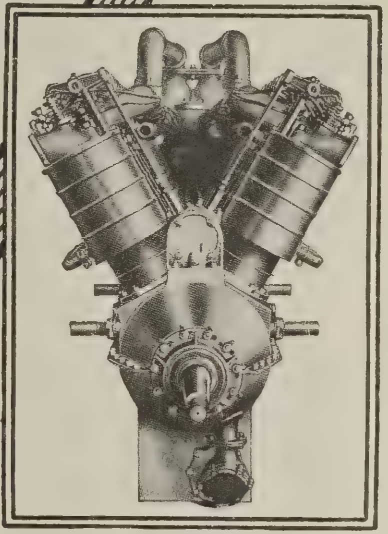
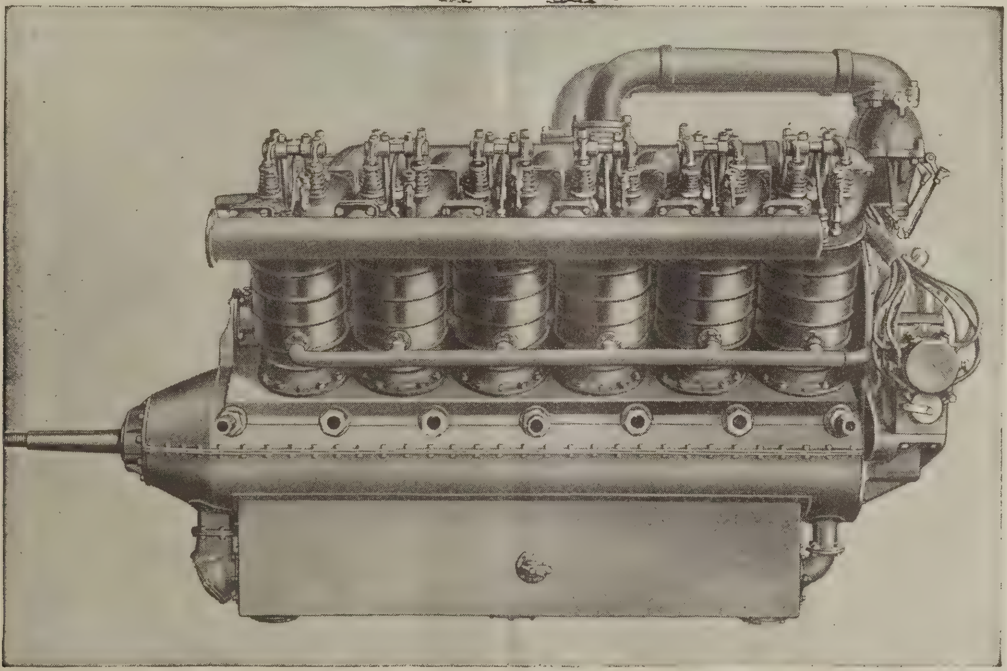
VAN BLERCK

"TWIN SIX"
AEROPLANE MOTORS

After many months of experimenting, building and rebuilding, testing and re-testing; after subjecting the motor to every conceivable form of abuse; after putting it through endurance runs many times more severe than could possibly occur in actual service, and having found the engine stand up against it with a virile strength that nothing could break, we offer this twelve cylinder 4½"x5½" motor and guarantee it to develop 185 H.P. at 1400 R.P.M. Full details, results of tests, etc., will gladly be furnished. Write for them.

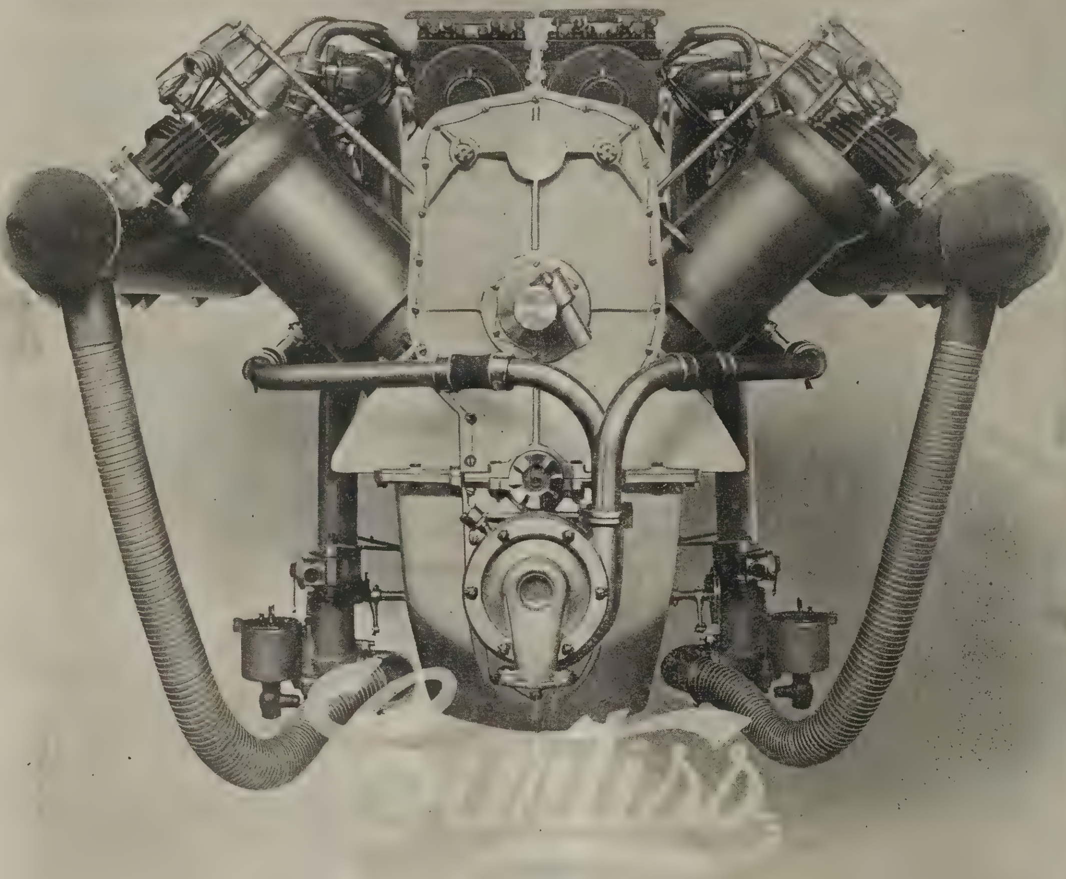






VAN BLERCK MOTOR CO.
MONROE, MICHIGAN

ELEVEN Curtiss machines equipped with Model V-X motors are in constant service on the Mexican border. Hundreds of flights are being made. Extraordinarily difficult conditions have been successfully overcome by these motors.



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WEEKLY

VOL 4, No. 2 SEPTEMBER 25, 1916 10 CENTS A COPY

Volunteer Aerial Coast Patrol Unit No. 1 Congratulated For Good Work

Article on Propellers

by Dr. A. F. Zahm

Announcement to Aeronautic Industry Regarding Extension of Pan-American Aeronautic Exposition

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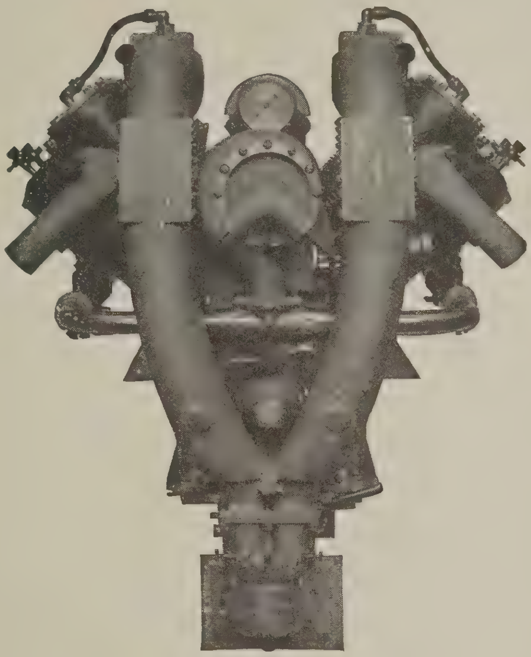

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VOL. IV NEW YORK, SEPTEMBER 25, 1916 No. 2

Volunteer Aerial Coast Patrol Unit No. 1 Congratulated for Good Work

THE Executive Committee of the Aero Club of America at its meeting this afternon considered the official report of the remarkable accomplishments of Aerial Coast Patrol Unit No. 1, which, although it was only organized in the past two months, participated in the manoeuvres of the "Mosquito Fleet," and gave remarkable demonstrations of efficiency in locating torpedo boat destroyers and mines submerged eighteen feet under water.

This work was done in very difficult weather conditions, and the destroyers were located during a storm. The Navy itself has never employed aeroplanes under such severe conditions.

Volunteer Aerial Coat Patrol Unit No. 1, which is stationed at Manhassett Bay, Long Island, is composed of the following members: F. T. Davison, Robert A. Lovett, John Vorys, John Farrell, 3d, Albert Dittman, Wesley Laud Brown, Artemus L. L. Gates, Erl Gould, Allen Ames, C. D. Winam, A. D. Sturtevant, and H. P. Davison. The Unit has three new Curtiss flying boats.

After considering the report, the Executive Committee authorized sending to the members of the Unit the following letter of appreciation:

"The Executive Committee of the Aero Club of America wishes to express its admiration for the splendid accomplishments of Volunteer Aerial Coast Patrol Unit No. 1 in connection with the naval manoeuvres held at Gravesend Bay on September 5th to 12th.

"Conditions obtaining at the time when one of your aeroplanes located the two torpedo destroyers, the Flusser and the Warrington, make us realize that such a thing could have happened under war conditions and this achievement would have saved New York from being bombarded by the enemy's fleet.

"Owing to the fact that the United States Navy has only a few aeroplanes and trained aviators, in case of war the naval aviators available would barely be sufficient to operate at one of the naval centers or in connection with one of the squadrons of the fleet. We can conceive of the Flusser and Warrington representing a raiding squadron of an enemy's fleet dominating a strategical point outside of New York Harbor and the raiding squadron having succeeded in getting near New York screened by the fog and being found by one of the seaplanes of the Volunteer Aerial Coast Patrol Unit No. 1, thereby saving the ships at the entrance of New York Harbor form being destroyed and New York City from being bombarded. Your valuable work in locating mines also deserves commendation.

"The fact that we have not an adequate Air Service accentuates the value of the efforts being made by the patriotic members of your Unit.

"Your good example is being followed by hundreds of others who realize that aeronautics is the most important branch of our defenses and that naval aeronautics has been shamefully neglected.

"We regret more than ever that Congress did not provide for establishing a chain of units of the Aerial Coast Patrol as your accomplishments have indisputably proven the great value of a chain of Aerial Coast Patrol stations to the nation. Had there been a unit of the Aerial Coast Patrol established in the neighborhood where the manoeuvres were held, the radio station on land could have been notified by wireless from the seaplane of the location of the attacking ships.

"We are glad to learn that the unit is going to New London, and will continue their practice in locating mines and submarines. It is most valuable work and is appreciated by the nation at large. "Very sincerely yours,

"ALAN R. HAWLEY,
"President, Aero Club of America."

Army Asks Bids for Aeroplanes

The Aviation Section of the Army is asking for bids for six, twelve and eighteen aeroplanes. For information address Lieut.-Col. George O. Squier, In Charge, Aviation Section of the Army, Washington, D. C.

First Aero Company, National Guard of New York Mustered out and Second Aero Company Disbanded

AFTER three months of camping at Mineola, Long Island, under army control, but without army support, the first Aero Company of the New York National Guard has asked to be mustered out of Federal Service and the Second Aero Company has been disbanded.

The mustering out of the First Aero Company does not necessarily mean that its members, and the aviation training which they have had will be lost to the cause of national defense, and it is hoped that the Company will continue its good work under its former status, as part of the unfederalized militia.

It is also to be hoped that the members of the Second Aero Company will continue their good work. The country needs every one of them.

The Commanding Officers of the First and Second Aero Companies are Captain Raynal C. Bolling of New York and Captain John M. Satterfield of Buffalo. They undertook to organize the Aero Companies with the assistance of the Aero Club of America eight months ago, when it was found that in eight years the Army had only been able to get thirty aviators and it became evident that the only solution to get the thousand aviators which this country ought to have is to train National Guardsmen.

These two officers and the Aero Club of America made every effort to raise the funds necessary to organize the companies and get the aeroplanes needed for training and succeeded in organizing the companies. Then, at the time of the Carisal tragedy, the Aviation Section of the Army undertook to train them, but has failed since then to supply the necessary aeroplanes and equipment.

The Guardsmen being anxious to complete their training, remained at Minneola all these weeks, a dozen of them getting training with the four aeroplanes belonging to the First Aero Company, and the only two aeroplanes which were sent to Minneola by the Army. But, besides the ninety Guardsmen of the First and Second Aero Companies, there are ten officers of the National Guard of ten other states, and there ought to be at least thirty aeroplanes at Mineola for training them. Instead, there are only eight, including one which only arrived less than a week ago and another which arrived two weeks ago.

The Guardsmen expected that as soon as Congress appropriated the $9,640,000 for training the National Guard in aviation the Army would supply all the aeroplanes needed, but for unknown reasons the Aviation Section of the Army, which has control of the expenditure of the $9,640,000, has not supplied them. On September 8th Adjutant General Stotesbury received the following order which has been sent to the National Guard of all states, stating that Congress has only allowed $76,000 for training National Guardsmen and only fifty Guardsmen will be trained, which is one to each state.

The order issued by the Aviation Section of the Army reads as follows:

WAR DEPARTMENT,
Militia Bureau,
Washington.
MB. 580. 7
September 8, 1916.

"From: The Chief of the Militia Bureau,

"To: The Adjutants Generals of all States, District of Columbia, and territory of Hawaii.

"Subject: Instructions in aviation.

"1. Attention is called to the provisions contained in the accompanying Circular No. 9, Militia Bureau, current series, concerning the organization of Aero Units and the physical examinations required for applicants for instruction in aviation.

"2. The present Congress has appropriated the sum of $76,000 for the purchase and maintenance of four aeroplanes, which are to be used at a United States Aviation School for the purpose of training such officers and enlisted men of the National Guard as may be authorized to attend the school for the purpose of pursuing a course in aviation.

"3. The course of training will cover a period of approximately six months and the number of students that can be trained with the number of machines made available by the appropriation will be not in excess of fifty. As it seems advisable to distribute this number among the various states, it is desired that each state select from its applicants only those who seem to give the greatest promise of success.

"4. Each applicant should be examined by a State Board of Medical Officers to ascertain whether the candidate can, in the opinion of the Board, pass the required physical examination as laid down in Circular No. 9, Militia Bureau, 1916.

"5. The applications of successful candidates, accompanied by the report of the State Medical Board, should be forwarded by the Adjutant General of the State to the Chief of the Militia Bureau, who will apply to the War Department for orders sending the applicant before a Board of Regular Army Surgeons for examination to determine his physical fitness for the duty required.

"6. Applicants who successfully pass the required physical examination and who are detailed by the War Department for instruction, will receive the same pay and allowances including those of travel to and from the school of instruction as are received by officers and enlisted men of the Regular Army of the same grade who are detailed on like duty.

"By the direction of the Secretary of War:

"(Signed) A. L. MILLS,
"Major Gen. General Staff."

Aero Club Contributed $21,535 to Organize Company

It was through the Club's efforts that the funds with which to start the Aero Company were raised. The club's first contribution was $12,250, which was given to General O'Ryan in November, 1915. Subsequently, other contributions were made by the Aero Club amounting to $8,985, making a total of $21,535, which the Aero Club of America contributed to organize and support the First Aero Company.

After the Aero Company had been mustered into Government service and it could not get aeroplanes from the Army with which to train, and there were close to 100 Guardsmen at Mineola kept in forced idleness through lack of aeroplanes, the Aero Club loaned to Captain Raynal C. Bolling, the Commanding Officer of the First Aero Company, the sum of $7,500, with which to buy an additional aeroplane. This loan was made with the stipulation that the money would be returned as soon as the Army appraised the aeroplanes of the First Aero Company and took them over, paying the appraised sum to the Aero Company. The appraisal took place recently, and Captain Bolling will return the $7,500 loan to the Aero Club as soon as the War Department remits for the aeroplanes taken over.

Offered to Guarantee $50,000 for Aeroplanes for Guardsmen

Last month, when the discontent created by the lack of aeroplanes for training grew worse, and the officers of the Aviation Section of the Army stated that they could not send additional aeroplanes to train the hundred National Guardsmen encamped at Minneola, the officers of the Aero Club offered to the Army to guarantee the payment of $50,000 worth of aeroplanes if the Army would order them for the training of the National Guardsmen. The officers of the club had been to see the Congressional leaders, and had received assurances that Congress would appropriate $9,640,000 for training hundreds of National Guardsmen and organizing and equipping and maintaining Aero Squadrons for the twelve Militia Divisions. Relying on this assurance, they were willing to guarantee the $50,000 with which to buy aeroplanes for training the Guardsmen whose enforced idleness not only prevented the adding of trained aviators to our aerial defenses, but also involved an economic loss of about $10,000 a week, being the sum represented by the salaries of the hundred Guardsmen.

Training of Hundreds of Guardsmen Delayed Since June 3

The officers of the Aero Club are unwilling to discuss this matter, the facts having been submitted to Secretary Baker and Lieut. George O. Squier, and official action being expected.

The following statement was given by one of the officers of the Club:

"There appears to have been a most unfortunate mistake made by the Aviation Section of the Army in connection with the First Aero Company and other officers of the National Guard of other states, who were mobilized at Minneola for training at the time of the Carizal tragedy. On the signing by the President of the new National Defense Act on June 3rd, 1916, and the passing by Congress of a resolution stating that this country was facing an emergency, the Aviation Section of the Army could have proceeded with the training of National Guardsmen in aviation, purchasing all the aeroplanes and equipment needed, all such expenses being met by the deficiency fund. Section 60 of the National Defense Act prescribes that the National Guard shall be organized the same way as the Regular Army.

"Had the Washington authorities followed the provisions of this Act, the aeroplanes and equipment needed could have promptly been secured and the 100 National Guardsmen would by now have passed their preliminary training, and be proceeding with their advanced training.

"Instead, nothing was done until the month of August, and very little then, and the members of the First Aero Squadron actually had to pay out of their own pocket for gasoline and oil with which to run their aeroplanes while training, although they had been mustered into the Federal service on July 13th.

"We have found the National Guard very efficient and anxious to train in aviation. The fact that the Army itself only got thirty aviators in eight years, whereas in a few months the National Guard, with more limited means, was able to put twice that number under training, and there are about one thousand other Guardsmen eager to take up aviation and waiting for an opportunity to get training, shows that the National Guard is to be the main source of supply for the thousand aviators which this country should have."

Canada to Have 500 Trained Fliers

PROFITING by England's costly experience in the great war, Canada has decided to maintain a permanent force of 500 trained military aviators after the war. These will be fully equipped for immediate service on a European basis of from two to three aeroplanes to each man.

Canada has already sent 450 aviators to the war, the greater number of whom are now on the western front. Many of these received their preliminary training in this country. A copy of the Canadian plans and regulations was received September 14 by Henry Woodhouse, of the Aero Club of America, and are briefly as follows: The candidates must be between 19 and 25 years old and must pass the usual physical tests.

If these are satisfactory, the applicant is accepted as a "candidate" for the air service, and then commences training in a private aviation school. Then he is entered as a Probationary Flight Sub-Lieutenant and gets a first-class passage to England, where he completes his training. When the candidate pays for his preliminary training there is refunded the amount he has spent, which is usually $400, and a bonus of $100 and $8 a week during the time he is in training there, is allowed him. After the candidate reaches England and obtains his military training he may be allowed to enter the Royal Naval Service, where he stands every chance of fast advancement. The grades in the Flying Service are equivalent to similar grades in the navy. The pay for the Flying Service in the navy is higher than that of the relative rank in the navy.

The pension allowances and those for officers killed in the service are similar to those of the British Navy, with the exception of those applying to the widows and children of officers.

All Canadian aviators in good standing at the end of the war will receive first-class passage back to their homes in the Dominion, in addition to allowances.

With 500 trained military aviators always ready for service and equal to any emergency, Canada will have a much more efficient air service than England had during the first six months of the war. How these aviators are to be used has not been made public, but it is understood that many of them will be employed in the Government transportation projects. Aeroplanes of great size and carrying capacity are being built in Canada and abroad, and these will be used in many localities where now it is only possible to travel and transport express by horse and pack animals.

THE NEWS OF THE WEEK

Harvard Students Graduate at Buffalo

Three days before the scheduled time, the Harvard students who were pupils at the Curtiss Flying School at Buffalo, finished their courses of instruction, and what is more remarkable in the annals of flying, every man in the squad of eleven qualified as a licensed pilot. The fact that every man has succeeded in qualifying, will be recognized as an exceptional record by all who are familiar with aviation.

The men were sent to the Curtiss school by the Undergraduate Aero Training Fund, which raised money for that purpose. The response to the appeal for contributions was generous, and before the season was well along sufficient funds had been obtained to have about twenty men thoroughly trained. During the entire course not a single accident marred the flights, nor was there a case of illness throughout the summer. Great credit is given all concerned, including the Curtiss Company, the men who were under the leadership of Eben S. Draper, of Hopedale, and Lieutenant Philips Rader, their instructor, for the successful conclusion of the course.

The men who took the course and received their licenses are Eben S. Draper, Frederick S. Allen, of New York; Francis I. Amory, Jr., of Beverly; William B. Bacon, of Brookline; Edmond E. Bates, of West Medford; Mahlon P. Bryan, of Brookline; Hamilton Coolidge, of Brookline; Donald D. Harries, of Cambridge; Henry H. Metcalf, of Westboro; Robert H. Stiles, of Fitchburg, and Joseph R. Torrey, 2d, of Worcester. A large part of the tuition of these men was paid by the Aero Club of America and Robert Bacon, former ambassador to France, who were deeply interested in the movement. Their course of training allowed them 400 minutes in the air, and manoeuvers of several different sorts were necessary before they could qualify for their licenses.

Other men have been sent to the Thomas school at Ithaca, where they are being taught solely the use of the water machines, and still others were sent to the Wright school at Mineola, at which at least one man has already qualified.

Observation Balloon for Militia in Texas

The first modern observation balloon in the American Army is to be given a test at El Paso in the near future. At the plant of an El Paso company a great, cigar-shaped bag is slowly taking form. It is the military observation balloon which the Goodyear Tire & Rubber Co. has presented to the Ohio National Guard on the border through Battery B of the First Ohio Artillery.

Sergt. Ralph Upson, of Battery B, is in charge of the balloon as an aviation expert. He was the winning pilot in the Gordon Bennett balloon cup race in Paris in 1913 and is an expert in affairs of the air.

Private C. F. Walker, also of Battery B, is his assistant. The basket will carry four passengers and the balloon is similar to those in use in the European war zone.

Wichita Aero Club to Hold Meet

Application for sanction for aviation races, with $20,000 in prizes, was received by the Aero Club of America from the Wichita Aero Club, of Wichita, Kansas on September 14th.

The telegram applying for the Aero Club's sanction reads as follows:

"Mr. Alan R. Hawley,
"297 Madison Ave., New York.

"Wichita Aviation Association proposes to hold mammoth aeroplane races October 25th to 27th. Prizes of twenty thousand dollars. Races to be fifty and one hundred miles. We want sanction and support of Aero Club of America. Please wire names of all available aviators and addresses. We want thirty aviators if possible. Prize money as high as three thousand dollars to individual winner. Wire answer.

"HAL M. BLACK,
"Secretary of Wichita Aero Club."

This application for sanction was considered by the Contest Committee, and the following telegram was sent:

"Mr. Hal M. Black,
"Secretary, Wichita Aero Club.
"Wichita, Kans.

"Your telegraphic application for sanction for aeroplane races October 25th to 27th with twenty thousand dollars in prizes received. There being no other races on the calendar for those dates, the Contest Committee will reserve these dates for you. Please have your bank transmit to Aero Club of America the usual guarantee for the twenty thousand dollars offered for prizes to be paid to contestants who are declared winners of the races by the judges appointed by the Contest Committee of the Aero Club of America. You may rest assured of the hearty cooperation of the Aero Club of America. List of names of aviators being sent to you

Mr. R. W. Judson, vice-president of the Continental Motors Company of Muskegon, Michigan, is an enthusiastic devotee of flying. Above on the left is Mr. Judson, being instructed by Frederick W. Zimmer of the Curtiss Aeroplane Co. Other views show Mr. Judson's hangar, its interior arrangement, and his boat in flight off his summer home on Mona Lake.

by mail. A cross-country aeroplane race such as you propose is of great importance, as it will afford training in cross-country flying by chart and compass. It is possible the War Department may allow Army and National Guard aviators to participate so that they may get the benefit of the cross-country flying experience afforded. Advise your communicating immediately with Lieut. Colonel George O. Squier, Chief, Aviation Section, U. S. A., Washington, D. C.

"Alan R. Hawley,
"Chairman. Contest Committee, Aero Club of America."

New Aerial Bomb Tested

There have been several experiments at the Wright Flying Field, at Mineola, in the last few days which promise to revolutionize the present method of dropping aerial bombs. The experiments have been conducted with the utmost secrecy.

It was learned that the experiments have been successful and that this government will have an aerial torpedo which will be important to warfare.

The torpedo is about six feet long and may be used either from an aeroplane or sent up and adjusted to fall at a certain place. It will have a propeller and wings which can be set. It has a radius of one hundred yards of explosive force, and at that distance could kill every man within that circle.

Officers of the First Aerial Company admitted that the torpedo was invented by F. E. Barlow, who is connected with the Frankford Arsenal, at Philadelphia.

From what could be learned, the bomb will be so constructed that the person who operates it may stay in one camp, and if an enemy camp were two miles away the projectile could be set to go through the air as far as that camp, when the engine would stop and the bomb fall to the ground, exploding just before it reached the earth.

Its inventor asserts its great value is in the fact that it explodes just before it reaches the ground, and the greater portion of its power does not sink in and be taken up by the earth, but spreads over a large territory.

The torpedo also may be carried on the bottom of an aeroplane, and the aviator can release it with a lever when he is over an enemy camp. The torpedo will then explode when near the ground.

Massachusetts Naval Militia Aero Corps in Camp

Naval preparedness in aviation received an impetus September 16, when members of the Massachusetts Naval Brigade went into camp at Mystery Island, off Manchester, to spend two weeks making flights and gaining experience with the air craft.

Many of the men are well known in business and social circles. They are from the Newburyport and Marblehead divisions of the Naval Militia, and include thirty men and eight officers. Three aeronautical pilots will have charge of the flying.

Ensigns Godfrey L. Cabot and Norman Cabot have the Burgess-Dunn machines in charge, while Ensign Norman Merrill will be the pilot of the naval tractor machine which was the gift of the Massachusetts Aero Club to the Naval Militia, a gift largely effected by Godfrey L. Cabot, president of the club.

About fifty of the State's naval flying squad went into camp. Unfortunately, Ensign Godfrey L. Cabot, one of the prime movers in the instruction camp, fractured his right wrist while cranking a machine. While his injury is not believed to be serious, he will be incapacitated for some time and will have to abandon his flights.

This is the first time that the Massachusetts naval airmen have had an opportunity to go into camp to study and practise the difficult tasks of an aviation officer.

Burgess News

Two hours after the receipt of an order from the Navy Department, the Burgess Company, at Marblehead, delivered on board the U. S. S. North Carolina, mother ship for aeroplanes, in President Roads, fifteen miles away, the first of a new class of navy school aeroplanes.

It was 3 o'clock in the afternoon of September 13 when the order was received, and the machine, although assembled, was in the Burgess Company hangar. The tanks were filled and the machine carefully inspected. It was then lowered into the water and Aviator Ellwood Doherty, of the Burgess Company, climbed into the pilot's seat, while Richard Korman, also of the Burgess Company, occupied the front or passenger seat. The engine was started and the machine got away at once, completing the fifteen-mile flight over Massachusetts Bay in slightly less than fifteen minutes. The air craft landed alongside the North Carolina and was hoisted aboard at once by the special apparatus which is carried for the purpose.

The aeroplane is a tractor. Flotation is supplied by two pontoons located beneath the fuselage, while the power plant consists of a Hall-Scott motor of 120 h. p.

With this the machine has an air speed of just under 70 miles an hour, and will climb at the rate of 230 feet a minute. Pilot and passenger sit tandem in the stream-lined body, and in each cockpit are the controls which operate the ailerons at the wing tips and the vertical and horizontal rudders at the rear.

W. Earl Dodge, who with his hydroaeroplane has been flying at Marblehead all summer, had his first accident, September 16. With F. C. G. Eden, he went up about 10:45 for a moonlight flight over the bay.

After passing over Prudence Island they prepared to alight and came down just outside the entrance to the inner harbor so as not to interfere with shipping.

As they struck the water something, thought to be a piece of submerged wreckage, pierced the nose of the boat, tearing a hole several inches long. To keep the airship up Dodge and Eden crawled out on the tail of the craft and there they were found wet and cold after they had drifted about for more than an hour.

The management of the International Wheat Show, which will be held in Wichita, Kan., October 2 to 14, have secured Miss Ruth Law, the famous girl aviator, to give free flights during the Exposition.

Miss Law has been giving flights in the east for the last few months. She demonstrated to the residents of Washington, D. C., how easy it would be to blow that city to smithereens before preparations could be made to defend it.

Messrs. Pattison, Bert Acosta, and John G. Gilpatric, three well-known aviators off duty in Toronto, Canada, where they are instructing for the Curtiss Aeroplanes and Motors, Ltd.

Propeller Stresses

By Leigh M. Griffith

I have been much interested in the matter of the stresses developed in aeroplane propellers, hubs and shafts, and as a result have carefully gone over the data presented by Dr. Zahm in your issue of the eleventh instant. While it is generally realized that Mr. Sperry's tentative figures, presented recently in your magazine, considerably overstated the forces involved, this is to be entirely charged to his asumption of high values for the constants.

In his case, Mr. Sperry evidently considered the wood propeller blade only, leaving out the metal hub entirely, so that his weight of 65 pounds is certainly a maximum for ten-foot blades, which would ordinarily weigh with plated tips about 40 to 45 pounds. Also, he assumes a radius of gyration of 3.05 feet, which is about 30 per cent of the diameter, as against an average of about 24 per cent for common practice, and which would only be true for heavily plated or extremely wide blades.

In the mater of the maximum precessional rate, I am in agreement with Mr. Sjerry as I have timed loops and steep spiral dives by other machines at less than six seconds per turn, or somewhat over one radian per second.

For the conditions given and assumed by Dr. Zahm, his figures are correct. However, I believe that he should at least double the precessional rate, to give a true indication of the worst conditions, and this would double the gyroscopic bending moment, which would become 446 pounds feet for one blade or 892 pounds feet for the whole propeller. This latter would be the moment also acting on the propeller shaft.

Miss Harriman Makes a Flight

Miss Ethel M. B. Harriman, daughter of Mrs. J. Borden Harriman, gave a thrill to society on September 14th, by making a spectacular aeroplane flight over Narragansett Bay.

Miss Harriman, who made her debut this summer at a party at the Clam Bake Club arranged by her aunt, Mrs. Joseph Harriman, is one of the most enthusiastic sportswomen there, and she is the first of the débutantes to take up aviation.

Her flight was made as the guest of Mr. W. Earl Dodge in his Curtiss flying boat, which was driven by Mr. Frederick Eden, a friend of Mr. Dodge. Miss Harriman wore a close fitting aviator's suit of khaki, with headgear to match.

The flight was made shortly before dusk, and the machine rose over the smooth water of the harbor, darted to the Jamestown shore and, after circling the torpedo and training stations, returned to the aviation camp at the southern end of the harbor. Mrs. Harriman and Mr. Dodge, with a few friends, watched the flight from the camp. Miss Harriman proved fearless in the air and expressed her delight with the trip.

Navy Bids Opened

The bids for the three, six, nine and twelve machines for navy instruction purposes were opened in Washington, September 5th. The following table shows the range of prices:

Number of Machines.	Planes. Low.	Planes. High.	Motors. Low.	Motors. High.	Complete Planes. Low.	Complete Planes. High.
3...........	$4,900	$10,160	$3,000	$4,960	$8,500	$12,520
6...........	4,750	10,960	3,000	4,910	8,000	12,320
9...........	4,550	10,760	3,000	4,910	7,750	12,120
12...........	4,250	10,560	3,000	4,910	7,500	11,920

Memorial to Lieut. Stolz Unveiled

At Mt. Nebo Cemetery, Cypress Hills, Long Island, on Sunday, September 17th, there was unveiled a memorial to the memory of the late Lieut. Melvin L. Stolz. Dr. Stephen S. Wise conducted the services and delivered a very eloquent address. Mr. Augustus Post represented the Aero Club of America. On the commemorative tablet there was a replica of the Aero Club of America medal which had been presented to Lieut. Stolz.

Advisory Committee Meets

The Executive Committee of the National Advisory Committee for Aeronautics held a meeting on September 14th in the new quarters of the committee in the Munsey Building.

The subcommittee on the relation of the atmosphere to aeronautics, of which Prof. Charles F. Marvin, of the Weather Bureau, is chairman, submitted a report on "The Physics of the Air," which will be prepared for publication in the next annual report of the Advisory Committee. This report contains a great deal of data and useful information on meteorology and weather conditions that should prove of practical value to aviators.

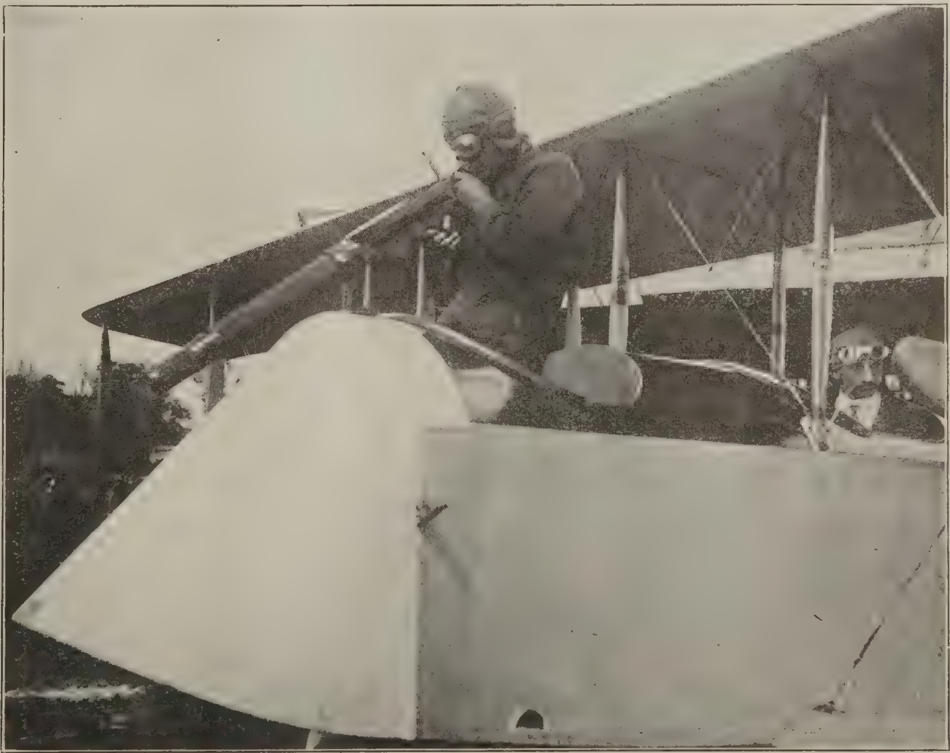
A report on aeronautical nomenclature was submitted by a subcommittee charged with its preparation. The committee has received many requests for copies of this report, indicating that the industry is eager to have and adopt standard terms and definitions in place of the many varied and confusing terms that have come into existence with the start and development of aeronautics. This report will be published in bulletin form and issued as a special report at an early date.

The subcommittee on aeronautic instruments is endeavoring to bring about the development of several new and needed instruments for the navigation and operation of aircraft, and at the present time is directly interested in the design of a "ground speed indicator" and an "angle of attack indicator."

A new committee was appointed to consider safe design, construction and navigation of aircraft.

Orlo Engines Ordered

It is reported that twenty engines have been ordered from the Orlo Motor Co. of Rochester, N. Y., to be installed in navy hydros at Pensacola. Orlo Welles is the designer of the motor, which we fully described in our issue of May 1, 1916.



The twin-motored machine of the Atlantic Aircraft Co., designed by Mr. A. S. Heinrich, and mounted with Lewis machine gun. Firing tests were made at Mineola, recently.

Opportunity for Designers

The United States Civil Service Commission announces an open competitive examination on September 26 for aeronautical mechanical draftsman, for men only. From the register of eligibles resulting from this examination certification will be made to fill four vacancies in this position, two at $1,800 and one at $1,200 per annum in the office of the Chief Signal Officer, War Department, Washington, D. C., and one in the Signal Corps Aviation School at San Diego, Cal., at $1,200 per annum. Further information and application blanks may be obtained from M. K. Wigton, local secretary, Board of United States Civil Service Examiners, Postoffice Building, Portland.

American Aircraft Company's Aeroplane Ready

Preliminary tests of the aeroplane manufactured at the American Aircraft plant, were completed Sept. 4, at Anderson, Ind., and it is announced that the machine is ready to fly now. The axle of the wheels which bear the plane, was bent by contact with a stump while the machine was being run over the field in preliminary tests. It will be necessary to install a heavier axle. Mr. Castory, the aviator, had to leave the city for a few days. He will return in a few days to make the first flight.

Baxter Adams, the Curtiss aviator, made the first cross-country flight ever attempted in northern Colorado on September 2. He flew from Loveland to Longmont, a distance of 21 miles, in 15 minutes.

Army Aviation Orders

A board of officers, to consist of Lieut.-Col. George O. Squier, Signal Corps; Capt. Richard C. Marshall, Jr., Q. M. C.; Capt. Virginius E. Clark, Signal Corps, and Capt. Thomas D. Milling, Signal Corps, is appointed to meet in this city to investigate suitability of the various military reservations for aviation purposes or acquire such knowledge as may be necessary.

Second Lieut. John E. Russell, Sixth Infantry, will proceed to Fort Sam Houston, Texas, for examination for detail in the aviation section of the Signal Corps.

Major William Mitchell, S. C., to Signal Corps Aviation Station, Chicago, Ill., for temporary duty pertaining to aeronautics.

Capt. Virginius E. Clark, aviation officer, S.C., to Philadelphia, Pa., for temporary duty pertaining to aeronautics.

First Lieut. Harold S. Martin, aviation officer, S.C., from duty at the Signal Corps Aviation Station, Mineola, Long Island, N. Y., to Boston, Mass., for the purpose of taking a post-graduate course in aeronautical engineering at the Massachusetts Institute of Technology.

Terah T. Maroney made a flight over Spokane, Wash., on September 3. He flew from the fair grounds to Hangman Creek and thence north to Hillyard, part of the distance at a height of 6,500 feet. He looped the loop, darting up and down. Maroney descended close to the earth over the business section. The whirr of his machine could easily be heard and his flight was witnessed by thousands.

Maroney hails from Seattle and is a flight lieutenant in the United States Army.

Life Saving by Hydroaeroplane

Too vigorous "rubbernecking" on the part of S. E. Kenney, well known Seattle lawyer, and Miss Vera Collins at a hydroaeroplane in flight over their canoe on Lake Washington nearly resulted in a fatality on September 11.

Their frail canoe was capsized. Miss Collins was seized with cramps, and when Mr. Kenney swam to her assistance she tried to grasp him about the neck. "Ed." Hubbard, who was volplaning in the seaplane of the Aero Products Company, noticed the couple's danger and went to their assistance.

He had them both out of the water while the nearest boat, which put off from shore with assistance, was still more than one hundred feet away.

Ensign Rutten Gets License

The Aeronautic Section of the First Battalion, N. M. N. Y., has just graduated Ensign C. E. Rutten, and he is now flying alone in the Curtiss flying boat of the battalion.

Lieutenant Harris and Ensign Rutten are making a photographic map of the coast line adjacent to their station at Bay Shore to demonstrate practicability of photographing the entire coast line from the air, showing selected landing places for our air craft. This should be of great value to the aerial coast patrol movement which is growing so rapidly.

Steps are now being taken to secure at least two more machines of a more seaworthy type which will be presented to the First Battalion in order to take care of their twelve flyers for the present.

Organizing Aero Unit for Indiana National Guard

First definite steps for the establishment of an aero unit for the Indiana National Guard were taken September 13 when Adjt. Gen. F. L. Bridges sent notifications to the Indiana troops at Llano Grande that he would receive applications from persons desiring to become pilots. Four or six of the applicants, if they succeed in passing the rigid physical examination, will be sent to the United States Aviation School in New York.

A. Todd Watson of Canton, Ohio has left for Buffalo where he will become a student in the Curtiss Aviation School. He intends to do exhibition flying upon receiving his license.

Kathryn Wolf, of Helena, Montana, recently went up in a military aeroplane as a passenger with Aviator Farman, one of the famous flying men of the French army. Miss Wolf is an American Red Cross nurse with the allies in France.

John Kenneth Howard, flew over Redwood City, Cal., on Sept. 5. Howard studied aviation at Santa Barbara and Sheepshead Bay. He expects to finish his course at Sheepshead Bay.

Scene at the Atlantic Coast Aeronautical Station at Newport News, Va., where much of the testing of Curtiss aeroplanes was done during the Summer.

FOREIGN NEWS

AUSTRIA.

The following is the official report for September 12th:

"Aviation—Last night our marine aeroplane squadron attacked airship sheds and the station at Gesi, emplacements at Falcodora, and anti-aircraft batteries at Ancona. Several bombs were seen to strike the airship sheds. Our aeroplanes were bombarded by anti-aircraft guns, but all returned undamaged."

The official statement from Austrian General Headquarters issued September 13 says:

"On Tuesday night our seaplane squadron dropped bombs on the railway precincts and military objectives at Cervignano. Several hits on the railway station were obtained and fires were started at various military points.

"Another seaplane squadron the same night attacked the naval port of Venice. Hits by the heaviest bombs were observed in the arsenal docks and near the gasometers, in Fort Alberoni and the docks at Chioggia. Despite very heavy bombardments both squadrons returned safely."

BELGIUM.

An official statement issued by the Belgian War Office says that a Belgian aviator flew over Brussels recently and dropped copies of a proclamation. Another aviator performed a similar mission over Antwerp.

FRANCE.

The following announcement was made by the War Office on September 15th:

"Our aviators on the Somme front distinguished themselves to-day, particularly in numerous combats above the enemy's lines. Lieut. Guynemer felled his sixteenth. Lieut. Nungesser his twelfth, Lieut. Heurtaux his sixth and Lieut. de Rotherford his sixth aircraft, while in a recent fight it is confirmed that Lieut. de Ullin won his sixth victory."

Kiffin Yates Rockwell has been proposed for nomination to the rank of second lieutenant for his work in the French aviation corps. He has shot down his fourth German aeroplane, as told in an official communique.

All the American volunteer aviators flying for France were in Paris Monday. It is reported that their squadron is on the way to the Somme battle front.

The official report from Paris, describing the forty air battles of Saturday, ends:

"Another enemy aviator was downed within the first German lines near Vauquois." This was the fourth officially recorded victory of Kiffin Rockwell, the American aviator with the French army. The next will put him in the class whose names are quoted officially.

Rockwell was flying alone in his machine over the Verdun sector when he sighted a two-seated German aeroplane. He attacked at an elevation of 9,750 feet, killing the German gunner with the first volley of his machine gun and probably hitting the pilot, who tried to reach land. Rockwell followed the German machine down to within 6,000 feet from the ground, keeping up his fire.

Two German aeroplanes then came to their comrade's rescue, and attacked Rockwell from above, putting him in a very dangerous position. Seeing that his first adversary was well finished, Rockwell turned on the two others and fired all his remaining cartridges. He got away safely, though his machine was hit many times.

The first German fell right in the enemy first line trenches, plainly visible to a French battery, which quickly smashed it to fragments.

British naval aeroplanes bombarded the German aerodrome at St. Denis, near Mons, Sept. 7 with good effect, the Admiralty announced today. One of the British aviators failed to return.

The raiders also brought down a German kite balloon in flames near Ostend.

British aviators have carried out another of the series of raids directed against Prussian aerial establishments in Belgium. The latest attack of this nature is described officially as follows:

"Our aeroplanes attacked the enemy's aerodromes at Ghistelles and Handzaeme, southwest of Bruges). A large number of bombs were dropped with satisfactory results. All our machines returned."

"Three British aeroplanes," says a British official statement, Sept. 9, reporting military operations in Egypt, "again bombed El Mazar yesterday. Eleven of the twenty bombs dropped were seen to take effect in the enemy camp."

GERMANY.

The German Lieutenant Fahlbusch, whose successful exploits in the air have been mentioned recently in official dispatches, has been killed in action, according to the "Vossiche Zeitung."

Seventy-eight aeroplanes were lost by the British and French as the result of aerial engagements on the Western front during August, according to figures given out by a competent authority, says the Overseas News Agency. Of this number forty-nine machines fell into German hands, thirty-one of the captured aeroplanes being British and eighteen French. Twenty-eight aeroplanes are positively known to have been shot down behind the hostile lines, it is declared, while one aeroplane was forced to descend behind the lines.

"The German losses of aeroplanes during August, before and behind the enemy's front, were seventeen," the statement adds. The Germans again mention the names, the types of aeroplanes, the numbers on the motors of the captured machines and the service in which they were engaged.

It was announced on Sept. 8 that several Russian aeroplanes attacked without success Angernsee in Courland. A German flier caused one of the raiding aeroplanes to land and its occupants were captured.

A Russian destroyer has been sunk in the Gulf of Riga by a Prussian aeroplane squadron, says a report given out by the German Admiralty. Other naval planes also have attacked Russian sea forces in the Black Sea off Constanza, Rumania.

The Admiralty statement follows:

"Prussian sea planes have attacked Russian sea forces off Constanza and the coast to the south. Hits on one battleship, one submarine and several destroyers were observed. All the seaplanes returned unharmed.

"On the evening of September 12 several naval aeroplanes attacked the enemy's sea force in the Gulf of Riga. Several hits were obtained, and one of the enemy's destroyers sank immediately. In spite of heavy shelling all the aeroplanes returned safely."

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GREAT BRITAIN.

The official report of September 12 follows:

"In the course of aerial fighting yesterday one of our machines, which returned safely, came in collision with a hostile aeroplane, which fell out of control and disappeared in the clouds. Today a hostile machine was brought down in our lines near Pozières. Two of our aeroplanes failed to return."

An exploit of British airmen in Palestine last month, when mountains were conquered by a squadron to drop bombs on the Turkish railway, is thus described in an official bulletin:

"Between Aug. 25 and 29 a series of attacks and reconnoissances upon the enemy's railway communications in Palestine was carried out by a British seaplane squadron under somewhat hazardous conditions, due to the fact that the railway runs for the most part behind a range of mountains difficult for seaplanes to surmount.

"Bombs were dropped on Afulch Junction, where considerable damage was done to the rolling stock and stores in the vicinity. A railway engine and fourteen carriages were set afire and destroyed. The railway stations at Tulkerm and Ardana and an enemy camp four miles to the northwest were successfully bombarded and severely damaged.

"On the 26th seaplanes bombarded the railway station at Home, forty-five miles inland."

Extraordinary developments in aviation under war pressure were shown in a performance given Sept. 17, by a military airman in the neighborhood of London for funds for war hospitals. As the story goes, Lieut. Robinson looped the loop three times in his joy after destroying the Zeppelin L-21.

The performer on the 17, began his stunt high in the air and made his big biplane do some wonderful bird-like evolutions. It was like figure skating if you can imagine a skater turning somersaults. By way of varying his intricate patterns he dived, turned over, and shot up again. He looped the loop twenty-three times, getting lower each time until he was too near the upturned faces for nervous watchers. It was a dance in the air as quick and sure as the sportive flight of a swallow at evening.

ITALY.

A squadron of Italian aeroplanes made a raid Sept. 13 on the Austrian arsenal and aeroplane hangars near Trieste, says an official statement issued by the War Office today. Five tons of high explosives were dropped and large fires were observed to result therefrom, the statement adds.

That portion of the War Office statement concerning aerial activity reads as follows:

"Enemy air craft dropped bombs on Auronzo, but they did no harm. Hydroaeroplanes directed against Ravenna were driven off by our batteries and aeroplanes. Last night an enemy air squadron bombarded San Giorgio di Nogaro, Villa Vicentina and other places in the Lower Isonzo district. One man was killed and some fires were caused.

"Yesterday afternoon in unfavorable atmospheric conditions a squadron of twenty-one of our Caproni battleplanes, escorted by Nieuport chasers made a raid on Lloyd's arsenal and hydroaeroplane hangars near Trieste. One hundred and seventy-two bombs, equivalent to five tons of high explosives, were dropped on the railway establishment and on ships under construction. Large fires were observed. Our aeroplanes were attacked by the enemy's anti-aircraft artillery and hydroaeroplanes, but all returned to their sheds."

In view of the recent aerial bombardments of Venice, Pope Benedict has renewed to Austria-Hungary his recommendation that during the war, churches, monuments and art treasures be spared. The wish of the Pope will be urged also by Mgr. Valfredi Ponzo, a prelate well acquainted with high Italian personages, who will soon go to Vienna as papal nuncio. Mr. Ponzo will fill the vacancy created by the elevation of Mgr. Scapinelli to be a cardinal.

At Turin on Sept. 14, Napoleone Rapini, an aviator with the Italian Army, with two passengers in a military aeroplane, set a new world's record, ascending 6,300 metres (20,670 feet).

RUMANIA.

The Rumanian Government is interning German, Austrian and Turkish subjects in hotels and houses in the centres where they would be placed in jeopardy from bombs dropped from aeroplanes. This action is taken to prevent air raids.

RUSSIA

A Reuter despatch from Petrograd says that four giant Russian aeroplanes of the Murometz type bombarded a Prussian seaplane station on Lake Angern, in the Gulf of Riga, where seventeen seaplanes of various sizes and models were discerned. The Russians dropped seventy-three bombs, with resultant fire and smoke which soon concealed the seaplane sheds.

Eight Prussian machines attacked the Russians but were soon put to flight with machine guns. During the bombing and air fight not less than eight Prussian machines were destroyed or put out of action. The Russian aeroplanes returned safely, notwithstanding they were shelled by anti-aircraft guns.

On a previous occasion, the correspondent says, one Murometz machine, with a crew of five, routed seven Prussian seaplanes which attacked it.

Announcement to th

The First Pan-America

Grand Central Palace, New Y

The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos-Dumont, Honorary President, Pan-American Aeronautic Federation.

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The preliminary announcement of the plans of the First Pan-American
for space have been received, that the original plans are being extended and the

The Exposition will afford the opportunity to show the tremendous prog

The people of two continents will come to the Exposition to see what
purposes and sport.

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Chairman, Howard E. Coffin, member of the Committee on Aeronautics of the Naval Consulting Board of the United States; Chairman of the Standardizing Committee of the American Society of Aeronautic Engineers.
Russell A. Alger, President, Aero Club of Michigan.
Roger Amory, Chairman, Executive Committee of the Harvard Undergraduate Aero Training Corps.
Gen. James Allen, President, Aero Club of Washington, D. C.
Ensign Vincent Astor, Commanding Officer, Aviation Section, Second Battalion, New York Naval Militia.
Bion J. Arnold, Member of the Committee on Aeronautics of the Naval Consulting Board of the United States.
Harry N. Atwood, President, Atwood Aeronautic Company.
Victor Hugo Barranco, Representative of Cuban Government.
Hon. John Barrett, Director General, the Pan-American Union.
Commander Frederic B. Bassett, Jr., U. S. N., in charge Naval Militia Affairs.
W. E. Boeing, President, Aero Club of the Northwest.
Marechal Borman, President, Aero Club of Brazil.
Cortlandt F. Bishop, Secretary-General, Pan-American Aeronautic Federation.
E. B. Brandee, President, Aero Club of Iowa.
Sr. Manuel Estrada Cabrera, President of Guatemala.
Roy D. Chapin, Citizens' Committee of Michigan Naval Militia Aviation Section.
Col. Charles Clifton, National Automobile Chamber of Commerce.
Glenn H. Curtiss, President, Curtiss Aeroplane & Motor Co.
Lieut. Greeley S. Curtis, Aviation Section, Massachusetts Naval Militia.
Robert J. Collier, Donor of the Collier Trophy.
F. T. Davidson, Organizer of Volunteer Aerial Coast Patrol Unit No. 1.
Amador F. del Solar, President, Aero Club of Peru.
Col. Carlos Nunez del Prado, President, Aero Club of Paraguay.
Charles Dickinson, President, Aero Club of Illinois.
Benjamin S. Foss, B. F. Sturtevant Company.
Prof. H. C. Frankenfield, U. S. Weather Bureau, Member National Aerial Coast Patrol Commission.
Jorge Matte Gormaz, President, Aero Club of Chile.
Edward M. Hager, President, Wright Aeroplane Company.

John Hays Hammond, Jr.,
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Silvio Pettirossi, President,

Aeronautic Industry

n Aeronautic Exposition

rk, February 8th to 15th, 1917

e Auspices of
b of America
eronautic Federation
f Aeronautic Engineers

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

ronautic Exposition has created such tremendous interest, and so many requests
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National Aerial Coast Patrol

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Van Blerck Motor Co.
y, Chairman, National Aerial

Club of Paraguay.

Lieut. T. J. Pierce, Commanding Officer, Aviation Detachment, Rhode Island Militia.
Ralph Pulitzer, Institutor of the National Aerial Derby.
Raymond B. Price, Vice-President, U. S. Rubber Co.
Prof. Michael I. Pupin, Columbia University.
Alfred Reeves, General Manager, National Automobile Chamber of Commerce.
Earle Remington, President, Aeronautical Society of California.
Franklin D. Roosevelt, Asst. Secretary, U. S. Navy Department
Naval Constructor H. C. Richardson, U. S. N.
F. H. Russell, Burgess Company.
Dr. Herbert C. Sadler, University of Michigan.
Joaquin C. Sanchez, President, Aero Club of Uruguay.
Alberto Santos-Dumont, President, Pan-American Aeronautic Federation.
Manuel Seminario, President, Aero Club of Ecuador.
John M. Satterfield, President, Aero Club of Buffalo.
Leland S. Scott, President, Hall-Scott Motor Car Co.
Commander Frank Simpson, Commanding Officer, Aviation Section, California Naval Militia.
Henry Souther, Engineering Advisor, U. S. Signal Corps.
Elmer A. Sperry, President, Sperry Gyroscope Company.
Lieut.-Col. George O. Squier, in Charge of Aeronautics, U. S. A.
Joseph A. Steinmetz, President, Aero Club of Pennsylvania.
S. W. Stratton, Director of the Bureau of Standards.
Lansing K. Tevis, Christofferson Aircraft Mfg. Co.
W. T. Thomas, President, Thomas Aeroplane & Motor Corporation.
Dr. W. D. Walcott, Chairman, National Advisory Committee, Secretary Smithsonian Institute.
Rodman Wanamaker, Governor, Aero Club of America.
G. Douglas Wardrop, Editor, AERIAL AGE WEEKLY; Managing Director, Aeronautic Photo and News Service.
L. B. Tompkins, President, L. W. F. Company.
Henry A. Wise Wood, President, American Society of Aeronautic Engineers.
Henry Woodhouse, Educational and Industrial Delegate, Pan-American Aeronautic Federation.
Orville Wright, Scientific Delegate, Pan-American Aeronautic Federation.

NOTE ON THE DYNAMICS OF A GYROSCOPIC PARTICLE WITH SPECIAL REFERENCE TO PERIODIC STRESSES IN A PROPELLER

By A. F. Zahm with calculations and diagrams by W. P. Loo, M. S.

Part I. Case of a Rigid Body.

Dynamics of a Gyroscopic Particle.—To find the rhythmic gyroscopic stresses in a rigid gyroscope, first assume it steadily rotating and precessing without translation, and let o, O, be the angular speeds of rotation and precession. Also assume the centroid at the origin of x, y, z, as in Fig. 1; and let the reference axes X, Y, Z, be respectively the rotation axis, the nutation axis, the precession axis; and call by like names the reference planes normal to these axes. Then any particle distant y from the nutation plane has, parallel to the rotation axis, the linear speed $yO = - rOcosa$, and the linear acceleration $roOsina = zoO$, r being the distance of the particle from the rotation axis, and z its linear, a its angular distance from the precession plane*.

About the axes of precession and nutation, therefore, the moments of a particle of mass m are $-myzoO$, mz^2oO, and have the resultant $mr^2oOsina$ about an axis perpendicular to r in axis of rotation.

For a group of three or four particles symmetrically spaced about the axis of rotation, the resultant gyroscopic moment is easily seen, from this expression, to be constant. In general, the gyroscopic torque is constant for any particle group having kinetic symmetry about the rotation axis, or whose fundamental** ellipsoid is a surface of revolution about that axis. For such symmetry Smyz*** = zero, and the value of the torque is $Smz^2oO = IoO$, where $I = Smz^2$.

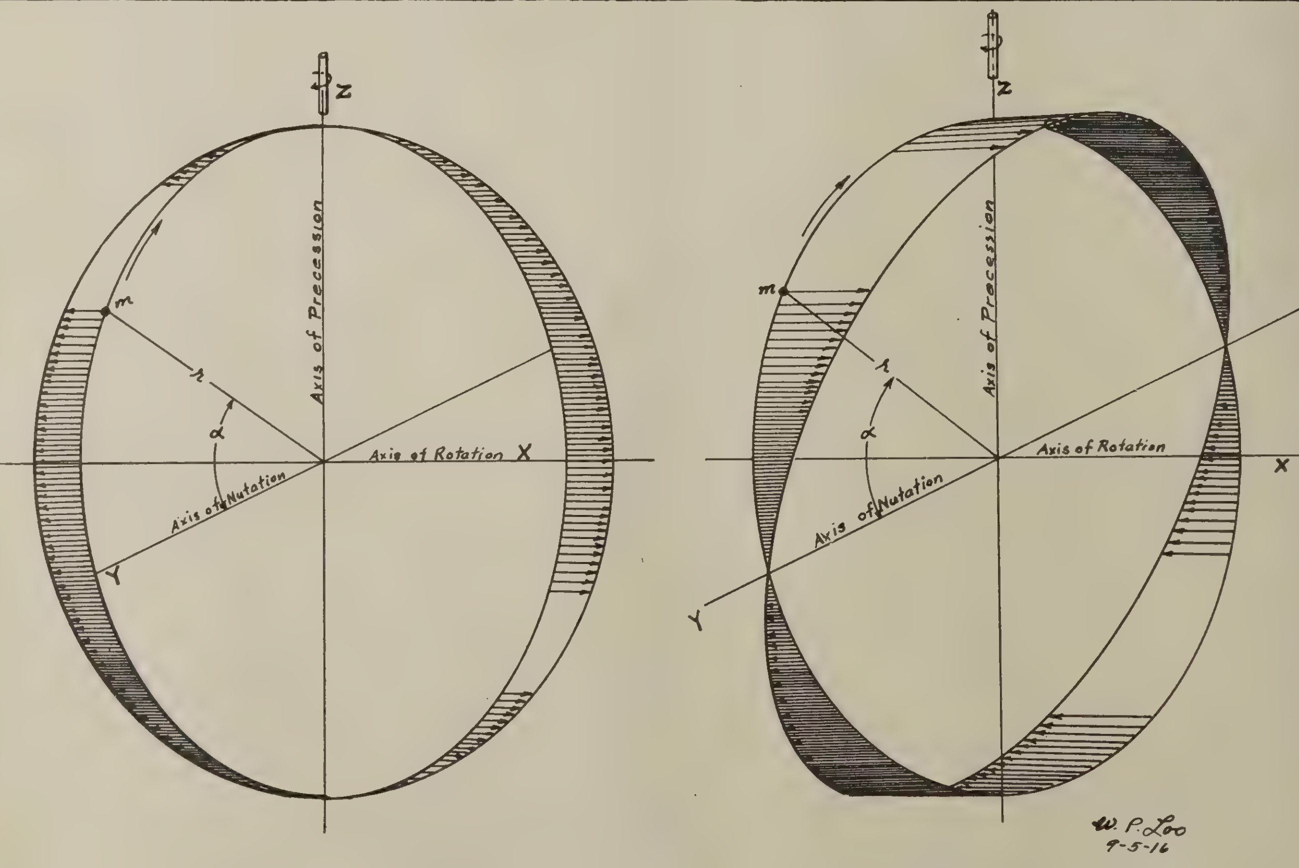
If, now, motion of translation be added to the above specified conditions, it will not alter the values found for the gyroscopic moments, as may be inferred from the principle of the independence of the motions of translation and rotation.

If nutation, as well as precession, be assumed, the ensuing gyroscopic effects can be inferred from analogy to the case already treated.

Illustrations.—Fig. 1 shows graphically for one revolution the above values of the linear velocity and acceleration of a particle in a gyroscope. The graphs, drawn upon a cylinder, are both sine curves but with a phase difference of one quadrant; that is the acceleration of the particle is greatest when its axial speed is least, and vice versa. Hence, referring to the X direction only, it appears that every particle of a precessing gyroscope performs simple harmonic motion across its instantaneous plane of rotation.

Fig. 2 shows graphically for one revolution the foregoing value of the total gyroscopic moment of a particle, as also its rectangular components.

Fig. 3 shows graphically, for several groups of particles symmetrically placed about the axis of rotation, both the component moments of each particle about the axes of precession and nutation, and the added particle moments for each group. The curves illustrate, what was seen analytically, that the component gyroscopic moments of each individual



Perspective Representation of Gyroscopic Velocity of a Particle m

Perspective Representation of Gyroscopic Acceleration of a Particle m.

Fig. 1

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*These are familiar equations in elementary mechanics.

**The fundamental ellipsoid is the polar reciprocal of the momental ellipsoid referred to the center of mass, and is a kind of space picture of the moment of inertia. In fact, the radius of inertia for any line thru the center of the fundamental ellipsoid is the segment cut off this line by the perpendicular tangent plane.

***The letter "S," as used throughout the test, signifies "summation."

particle of the group are represented by sine square curves for the nutation axis, sine cosine curves for the precession axis, whereas the summation of the moments about these axes, of all the particles, is zero or constant for each group of particles except the binary one, for which the summation is variable about both axes. The two-particle group, or a uniform material line joining the particles shown, has the resultant moment $Smr^2oOsina$, whose extreme values are zero and IoO, I being the moment of inertia of the material aggregate about its center, i. e., $I = Smr^2$.

Application to Propellers.—From the foregoing analysis it appears, using the same notation, that rigid and steadily precessing one-dimensional* propellers, and approximately also propellers with straight narrow blades, are subject to the following laws:

1. Every blade is urged to simple harmonic motion, of the same period as that of the shaft, across the instantaneous plane of rotation, and hence sustains a reversal of gyroscopic stress twice each revolution.

2. Every blade sustains a fluctuating gyroscopic moment whose magnitude at the hub is $Smr^2oOsina$, and which at quadrant intervals in each revolution has the successive values IoO, zero, IoO, zero.

3. The aggregate gyroscopic moment transmitted to the shaft by a two-blade propeller is variable and at all instants equal to twice that of one blade.

4. The aggregate gyroscopic torque transmitted to the shaft by a steady running multiblade propeller is constant and at every instant equals the geometric sum of the varying moments of the individual blades. For example, calling the maximum gyroscopic torque of one blade of a propeller unity, the constant torque of a three-blade screw is 1.5; of a four-blade screw 2.0; of a six-blade screw, 3.0, etc.

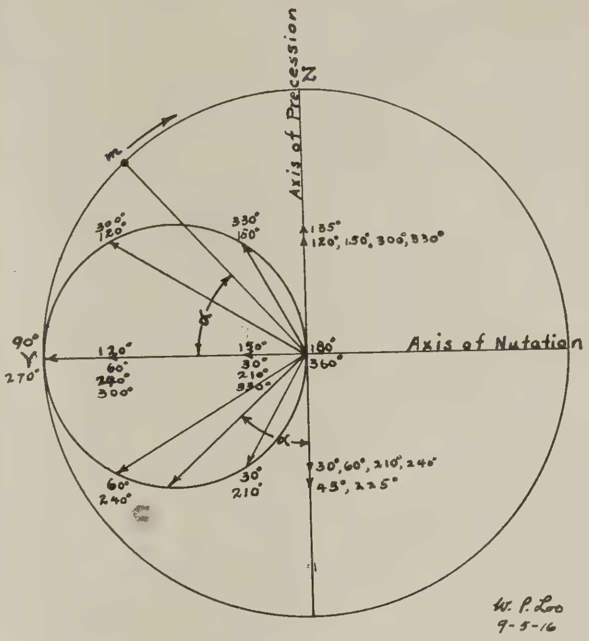

Fig. 2.
Vector Diagram of Gyroscopic Torques.
Axis of rotation perpendicular to plane of paper with positive direction upward.
Component Torques Represented by Arrows on the Axes
Resultant " " " the Oblique Arrows

(Continued on page 51)

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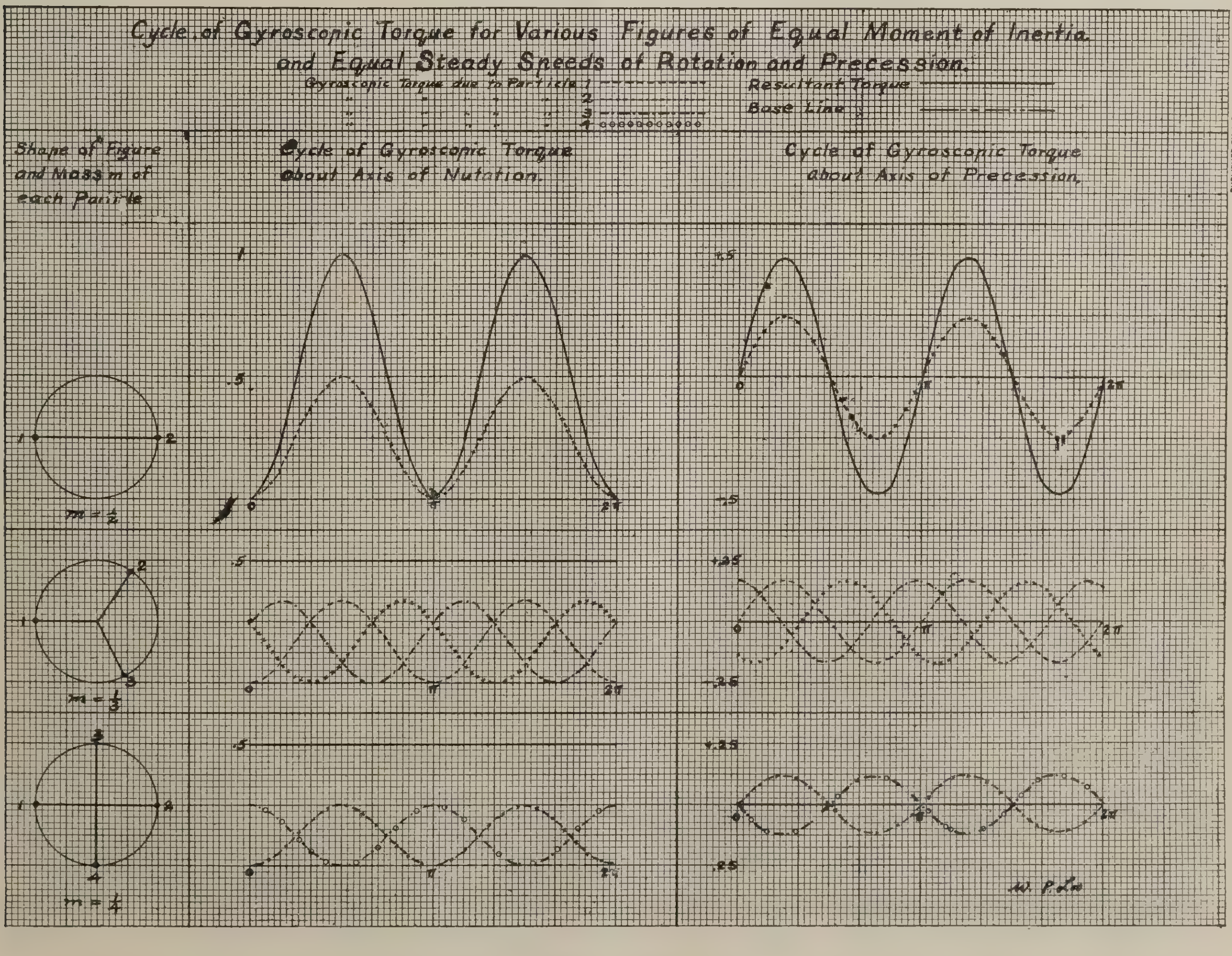
* A one-dimensional propeller may be defined as a propeller composed of infinitely narrow blades symmetrically radiating from a point on the axis of rotation. The blades will here be assumed straight.



MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz

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MODEL AERO CLUB OF OXFORD
Oxford, Pa.

National Model Aeroplane Competition

August Contest—R. O. G. Distance
Illinois Model Aero Club

	Best Flight			Total	Average
Wm. Schweitzer	1880	1130	40	[illegible]050	1016.2
Ward Pease	939	665	554	2158	719.1
T. Hall	625	415	125	1165	388.1
Wm. Sprague	1982	42	0	2024	674.2
P. Lahosiah	548	375	385	1308	436.
Lucas-Cook	0	0	0	0	0.
Total average					3233.6
Club average					538.9

Aero Science Club of America

	Best Flight			Total	Average
C. W. Meyer	1672	1237	0	2909	969.6
A. R. Barker	883	600		883	261.0
Total average					1230.6
Club average					205.

Aero Science Club of America
(Mechanical driven model contest)

Fred. C. Thiele	230	114
Ladis Gladki	0	0
Frank Schober	0	0

July Contest—R. O. W. Duration
Illinois Model Aero Club

	Best Flight			Total	Av'r'ge
Joseph Lucas	80.2	80.2	58.2	224.8	74.9
E. C. Cook	96.8	89.8	4.8	191.4	63.8
Ward Pease	81.6	66.2	58.6	201.8	67.2
D. Lathrop	83.6	48.	3.6	135.2	45.
Lakosiah	60.	52.4	19.	131.4	43.8
Total average					294.7
Club average					42.4

Aero Science Club of America
R. O. G. Duration
(Mechanical driven model contest)

Frank Schober	20.	26⅗	10.
F. C. Thiele	11⅖	11.	10⅖

Aero Science Club of America

A very successful meeting was held on Saturday, the 16th inst. Mr. August Post, of the Aero Club of America, who is actively interested in the National Model Aeroplane Competition, was unanimously elected an honorary member of the club. He promised to attend one of the next meetings and have a talk with the members about model aircraft, their purpose and development.

Only part of the contestants could get their compressed air models ready for the contest in Glen Ridge, N. J. It was resolved to hold the contest on August 30th, at the same place.

The best flight of the day was made by Mr. C. W. Myers with a rubber-driven model 117 sec. R. O. G. Interesting developments may be expected when the model is properly tuned up. The compressed air tractor of Mr. F. C. Thiele, mentioned in last week's issue, achieved a flight of 403 feet, coming pretty close to the record.

Mr. James Barker is working on a full-size tractor biplane.

All members are requested to attend the coming meeting on the 25th, as a new constitution will be voted on.

For particulars address Secretary, 29 W. 39th St., New York City.

Buffalo Aero Science Club

The field meet held on September 9 was very successful considering that a high, gusty wind prevailed. This caused several bad smashes, but many good flights were made. The object of the meet was a preliminary for the meet to be held at the Curtiss Aerodrome, Sunday afternoon, September 24. Many new models were flown and one, constructed by Mr. Leon Schreier, broke the world's record for distance, R. O. G. The former record was 1,761 feet, but Mr. Schreier's model flew 1,815 feet after gaining about 350 feet altitude. It left the ground after a run of only 4½ feet and proved a very stable flyer.

A regular meeting was held September 12. The construction of a monoplane glider was considered and decision was made to build it during the winter months.

Pacific Northwest Model Club

At a contest staged on Harbor Island, September 2, by the Pacific Northwest Model Aero Club of Seattle for R. O. G. models, the former record of 60 seconds' duration was twice broken.

René Valadon was the first to raise the mark by a flight of 80 seconds, with his large model with 52-inch span. Clyde Atteberry then extended this to 115 seconds later in the day. This mark is the highest that has ever been made in any event by this club.

Mr. John McMahon of the Aero Science Club and his tractor model. This model is equipped with a two-cylinder opposed compressed air motor. Models of this design are being flown in the National Model Aeroplane Competition.

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Advice to Aeroplane Enthusiasts

Walk right into the hangar with a cigar in your mouth and look at the machines.

Ask the pilot all the foolish questions you can—he likes to answer them.

Give the propeller a few twists for fun. It is nice to watch it go round.

See how firm the wing covering is. If it is too strong for your efforts, take a knife and see if you can puncture it. This will cause no end of amusement to the pilot and his mechanics.

Always carry lighted cigars around the motors and gasoline cans, as the suspense created causes innocent enjoyment.

Get in the machine and work all the controls. They break sometimes, but the aeronaut does not mind mending them as long as you are enjoying yourself.

See how taut the wires are. If they resist your strength loosen them up, as they are too tight for the aviator to fly the machine.

Help the mechanician fix the motor. You may not know how, but he will appreciate your efforts. Anyway he does not know anything about it as he has only spent ten or twelve years in learning.

Ask the pilot to take you for a flight. He is never asked for a flight and would be overjoyed to gratify your curiosity. (He gets only fifteen or twenty dollars a flight.)

Tell him all the funny stories you know just at the time when he is fixing a delicate part of his motor. That will keep him in good humor.

Ask him how much he pays for his gasoline and how many times he has fallen and doesn't he think he is foolish to risk his life.

Of course these are offered as suggestions; you can think up other things to do and say which will please him and make his life easier.

At Palm Beach

Fair One—"These bathing suits make people look long, don't they?"

Her Friend (the Pilot)—"And people look longer, too!"

Member of the Royal Flying Corps (first day out of hospital). "SPEED UP, MAN—SPEED UP!"

Foreseen

"Did you hear that Jiggs was killed while traveling in Kentucky?"

"No. How was he killed?"

"In a feud."

"And I always told him not to ride in those cheap cars."

Welcome

In a little bush league town out West the ball club considers itself lucky, if, at the end of the season, gate receipts have been enough to pay expenses and there is enough over to buy a round of cigars.

During a recent game a biplane was observed hovering low over the park, and the manager was just wondering whether airships were to be added to house roofs and knotholes as a medium for beating the gate, when the machine lurched and dropped rather heavily into the outfield.

Presently the birdman opened his eyes to find the manager bending solicitously over him. That official gave a sigh of relief at the stranger's return to life, and remarked cheerfully:

"Feeling all right, now, old fellow? Then you can just give me your quarter and we'll go on with the game!"

A Puerile Poem

When Jack fell from his aeroplane
He took a desperate chance
And landing in some marshy ground
He made his mark in France.

Where Ignorance is Bliss

A short time ago when Mr. Trubee Davidson had made quite a hurried descent to the river in his flying boat, an enterprising reporter telephoned to the Aero Club of America, and speaking to Mr. Augustus Post, asked the reason for the mishap. Mr. Post told him that when Mr. Davidson had arrived over the Flying Yacht Club landing he found that one of his cylinders was missing. Whereupon the reporter in all seriousness replied, "What! Did he forget to put it on before he started?"

It seems that two negroes had been walking through a cemetery and one of them, becoming frightened, set out at a furious pace for the town ahead. The other one, not being frightened, continued his leisure steps to the town where a lot of men were standing and talking in heightened voices.

He went up to one of them and said, "Say, Sam, did Jack White come by here?"

"He suttinly did," was the reply.

"Was he going fast?"

"Mah Lord, man, dat niggah wuz going so fast dat if he had one feather in his hand he would a' *flew.*"

Monkey Ranches Scarce

An aviator landed in the outskirts of a western town with some plugs which needed tightening up. The only person he could see around was a big shock-headed Swede.

"Say, friend," he said, "could you tell me where I could find a monkey wrench?"

The Swede looked at him blankly for a moment and then replied, "No, dis here bane sheep ranch an over dar bane a cattle ranch. Ay doan know vare de hall's a monkey ranch!"—*M. P.*

Curtiss

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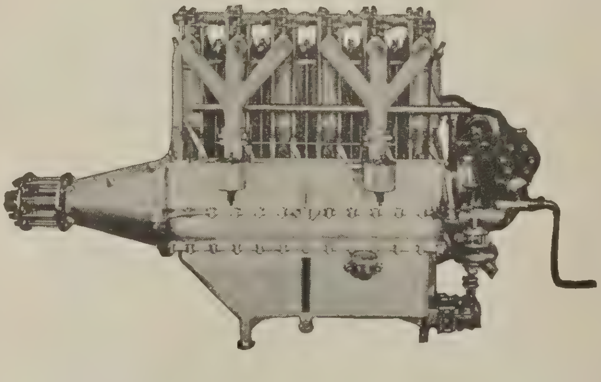

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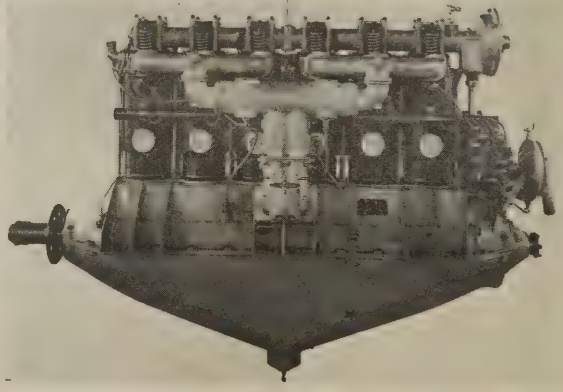

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Personal Pars

Mr. Roderick W. Wright, formerly instructor at the Wright Aviation School, is now with the Sturtevant Aeroplane Co. as testing pilot.

Louis Gertson astonished 200,000 spectators at the Indiana State Fair, Indianapolis, with his numerous loops, upside down flying and tail sliding. Mr. Charles Downing, Secretary Indiana State Fair, was loud in his praise of Gertson's sensational flights, especially at night, with his machine illuminated and carrying great streamers of Niagara flares behind. Gertson flew five days and nights. A new 90 H. P. Gyro motor was shipped to Gertson from the factory to Indianapolis, and was installed immediately by Mr. R. S. Moore, of Washington, D. C.

Lieutenant Herbert Dargue and Lieutenant William Robertson, of the North Island Aviation School, had a narrow escape from death September 14 during a night bomb-throwing flight when at a height of 4,500 feet the motor back-fired and the aeroplane went into a "side slip," falling more than a thousand feet before Dargue succeeded in righting it. During his final volplane Dargue missed smashing into a hangar by a few feet.

With Dargue as pilot and Robertson as bomb-thrower, five-pound illuminating bombs were hurled from a height of 5,000 feet, exploding over warships in the bay at a height of 2,000 feet.

Goodrich Killed in France

A cablegram was received by A. F. Goodrich, of Hallowell, Maine, from the secretary of the British war office stating that his son, Capt. Frank E. Goodrich, of the British Royal Flying Corps, was killed in action September 12 somewhere in France. No further particulars were given. Goodrich, who was 22 years old, enlisted in Canada early in the war, and was decorated and promoted for bravery in the face of the enemy.

Art Smith to Japan Again?

Reports come from Fort Wayne, Ind., that Art Smith, who is now in a Chicago hospital recovering from the injuries sustained in a fall in Japan, has made his last flight. The report says that as soon as he recovers he will return to Japan and become interested in a $5,000,000 plant which will manufacture aeroplanes designed for long trips, and will carry mail and passengers across oceans as well as continents.

William Christianson, a Chicago aviator was seriously injured on September 9, when his machine dropped 500 feet while he was flying over West Chicago. He suffered a fractured skull, a broken arm and serious internal injuries.

Note on the Dynamics of a Gyroscopic Particle

(Continued from page 47)

Part II. Case of a Non-Rigid Body.

All ordinary gyroscopes are practically rigid and in their ultimate parts are subject to the gyroscopic effects heretofore delineated. But propellers, more especially non-metal ones, possess considerable flexibility. Their blades consequently yield to the gyroscopic force so as to shift the cardinal points of acceleration and velocity shown in Fig. 1. Also the vibrations of flexible blades are cumulative under the pulsating stresses, until the damping factors—air pressure and internal viscosity—of the blade limit its rhythmic excursions. The damping due to internal viscosity is sometimes great enough to raise the temperature of the propeller considerably, especially at or near the hub. No method of analysis is available to give an accurate estimate of the straining effects in elastic blades. But it is well enough known how fatigue induced by rapidly fluctuating, and especially rapidly alternating* stresses, shortens the life of the material.

It can be shown by elementary mechanics that the period of vibration of each particle of a rotating propeller blade, due to centrifugal force alone, is equal to the period of rotation, whatever the radial distance. **This property favors cumulative vibrations when the disturbing forces have the same period as the propeller. The gyroscopic force in a blade has been shown to have such a period. The varying air pressure on the blade has also that period in many instances; for example, when the air flow toward the screw is oblique to the axis, or when the air speed of approach is greater at one part of a blade revolution than another. For this reason propeller blades are sometimes designed to have under fiber stress alone, a free vibrational frequency about fifty per cent greater than the frequency of rotation.

---

*Since the gyroscopic stresses alternate, the blade stresses also may alternate when the air force slackens, as at low throttle.

**Since the radial acceleration of any particle is ro^2, the consequent frequency of vibratior is $N = \frac{1}{2\pi}\sqrt{\frac{r0^2}{r}} = \frac{0}{2\pi}$

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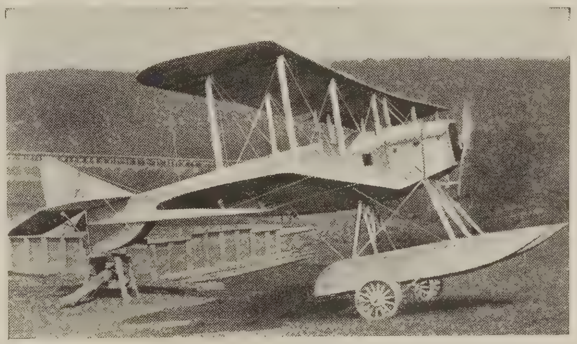

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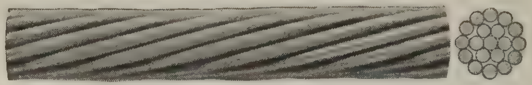

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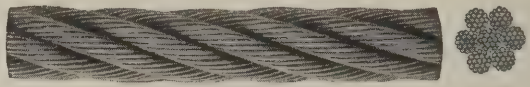

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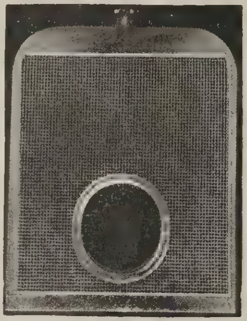

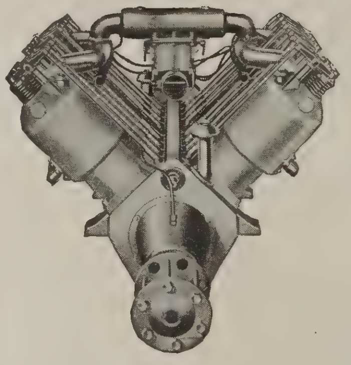

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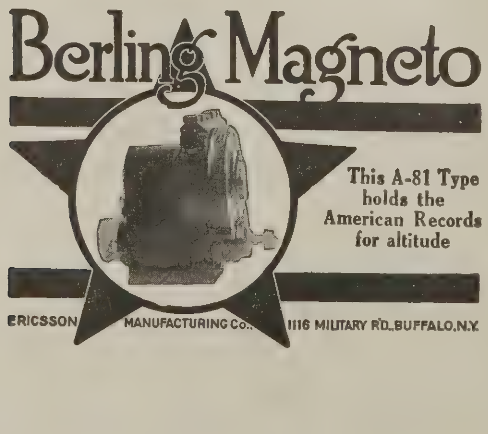

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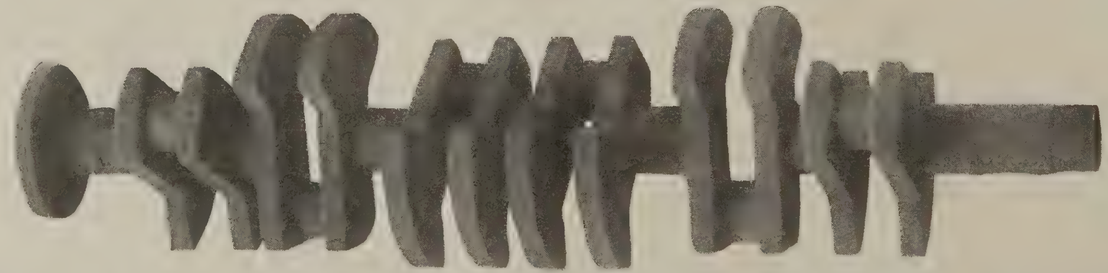

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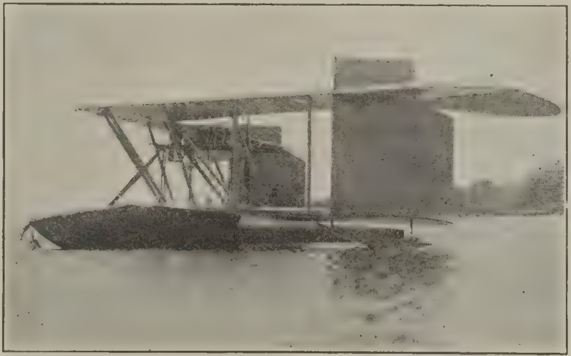

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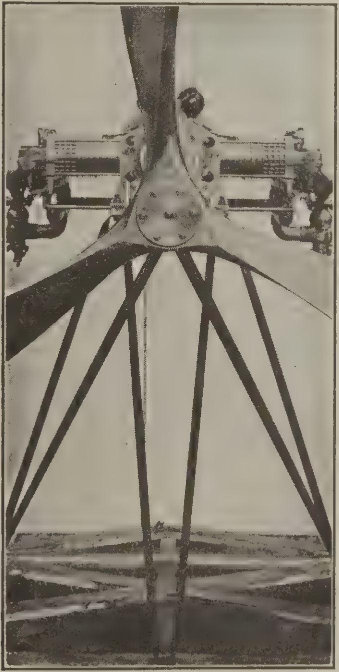

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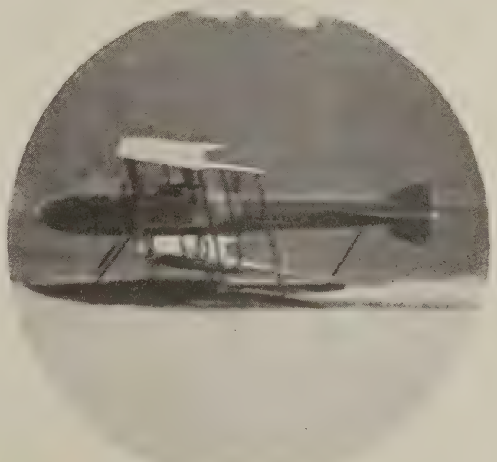

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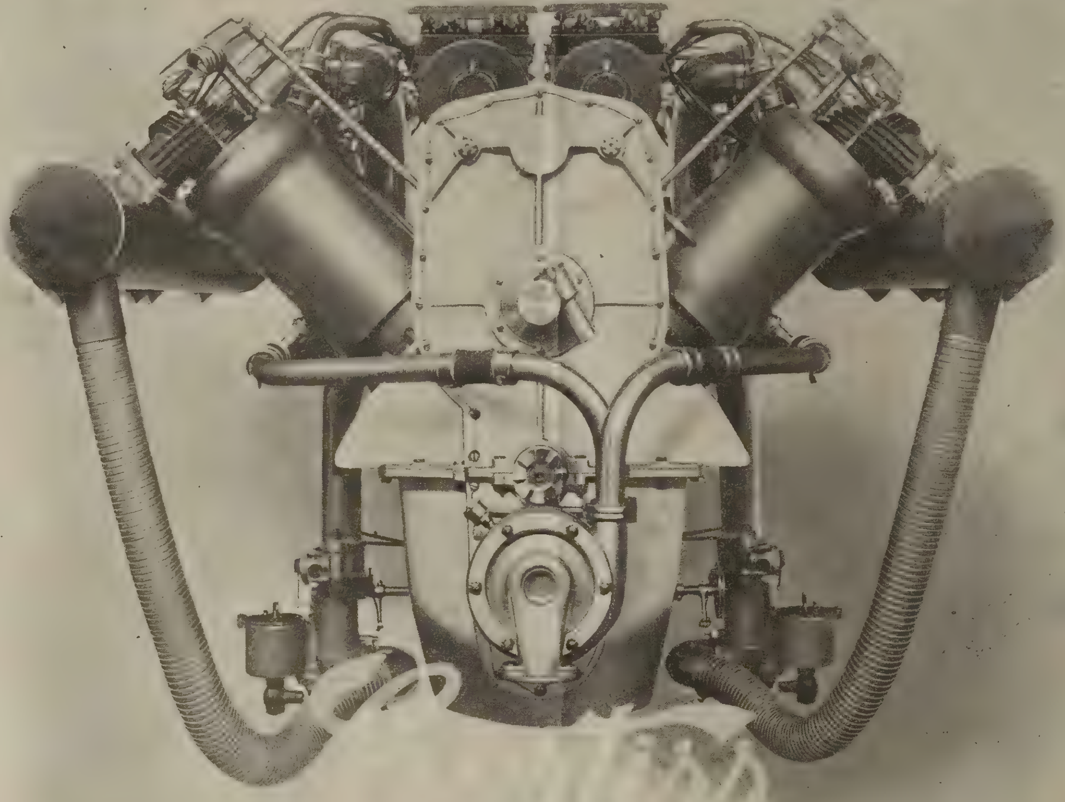

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AERIAL AGE WEEKLY

VOL. 4, No. 3 OCTOBER, 2, 1916 10 CENTS A COPY

Mobilizing Our National Resources to Safeguard the Nation and Build up National Prosperity

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W. Earl Dodge to Train Sixteen College Men

Atlantic Aircraft Co. Battleplane Described

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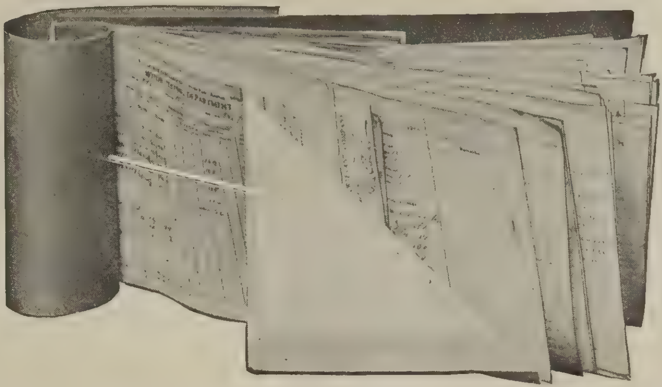

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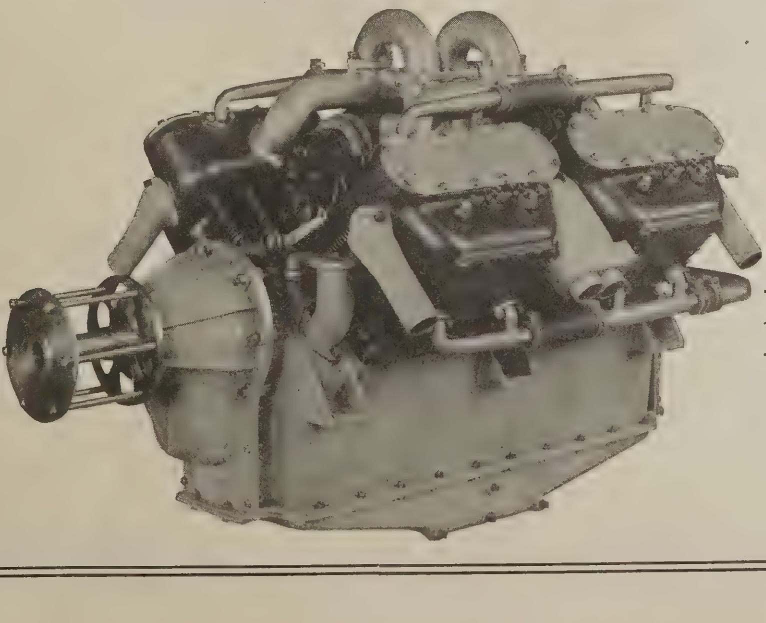

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The Pan-American Aeronautic Federation
The American Society of Aeronautic Engineers

THE preliminary announcement of the plans of the First Pan-American Aeronautic Exposition has created such tremendous interest, and so many requests for space have been received, that the original plans are being extended and the show space is being doubled.

The Exposition will afford the opportunity to show the tremendous progress that has been made in American Aeronautics in the past two years.

The people of two continents will come to the Exposition to see what the American Aeronautic Industry has produced for National Defense, utilitarian purposes and sport.

The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos - Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

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WEEKLY

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VOL. IV NEW YORK, OCTOBER 2, 1916 No. 3

MOBILIZING OUR NATIONAL RESOURCES TO SAFEGUARD THE NATION AND BUILD UP NATIONAL PROSPERITY

WHEN the leaders of the national defense movement took stock of our national defenses, two and a half years ago, they found a most amazing situation, which still exists to a great extent. This wonderful nation of ours had and has a population of 105,000,000, not less than 19,000,000 of which are men of military age; a national wealth amounting to $200,000,000,000; and industrial resources such as no other nation in the world has.

But at that time our hundred million people were apparently not interested in national welfare; only a very small fraction of the men of military age had had any military training; and our tremendous industries, owing to our Government's neglect, were in no way coordinated or prepared to assist the Government in an emergency.

The conclusions are obvious. Lack of interest in national welfare on the part of the general public "Chinafied" this great nation and made it appear helpless before the world—keeping it from the rank among nations which is due to it; the nineteen million men of military age, being untrained, and there being no arms or provisions available for them, would be helpless if it became necessary for them to face half a million trained soldiers; our industries, unrelated to the central Government and ignorant of the Government's needs, would be impotent in the face of imminent danger.

The people and the tremendous wealth of this great nation were, therefore, utterly unprotected.

The country is beginning to appreciate the extent of the patriotic service rendered to the nation by those few public spirited leaders of the national defense movement who awoke the country to the danger of the existing situation. Thanks to their efforts, the country was made to realize, if only in a small way, the necessity of building up our national defenses as a means of protecting the nation and placing this country in a position where it may, if the opportunity presents itself, use its influence and power for the preservation of international peace. Congress, responding to public demand, allowed substantial appropriations for the upbuilding of our Army and Navy, and special provision was made for training men of military age. Patriotic organizations like the Aero Club of America, concentrated their efforts in training men so as to form reserves of trained men, who, while being employed in peaceful pursuits, would be available to meet a national emergency.

To bring about closer cooperation between the different branches of the Government and to coordinate the national resources, the Conference Committee on National Preparedness, to which belong the Aero Club of America, the National Security League, the Patriotic Education Society, the Army League, and other patriotic organizations, advocated in the spring of 1915 the establishing of a Council of National Defense, to be composed of the heads of the Cabinet and the most important Committees of Congress, and civilian experts. Then the Secretary of the Navy created the Naval Consulting Board, and subsequently, mainly through the efforts of Howard E. Coffin, of the Naval Consulting Board, there was put into effect a movement to mobilize the industries.

Congress was quick in realizing the value of the Council of National Defense and of coordinating the industries for national defense. Therefore, the Council was authorized. Its purpose is given in the wording of the Congressional authorization, which was part of the Army Appropriation Bill (H. R. 17498), as follows:

"That a Council of National Defense is hereby established, *for the coordination of industries and resources for the national security and welfare*, to consist of the Secretary of War, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, and the Secretary of Labor.

"That the Council of National Defense shall nominate to the President, and the President shall appoint, an advisory commission, consisting of not more than seven persons, each of whom shall have special knowledge of some industry, public utility, or the development of some natural resource, or be otherwise specially qualified, in the opinion for the Council, for the performance of the duties hereinafter provided. The members of the advisory commission shall serve without compensation, but shall be allowed actual expenses of travel and subsistence when attending meetings of the commission or engaged in investigations pertaining to its activities. The advisory commission shall hold such meetings as shall be called by the council or be provided by the rules and regulations adopted by the council for the conduct of its work.

"That it shall be the duty of the Council of National Defense to supervise and direct investigations and make recommendations to the President and the heads of the executive departments as to the location of railroads with reference to the frontier of the United States so as to render possible expeditions, concentration of troops and supplies to points of defense; the coordination of military, industrial, and commercial purposes in the location of extensive highways; the mobilization of military and naval resources for defense; *the increase of domestic production of articles and materials essential to the support of armies and of the people during the interruption of foreign* commerce; the development of seagoing transportation; data as to amounts, location, method and means of production, and availability of military supplies; *the giving of information to producers and manufacturers as to the class of supplies needed by the military and other services of the Government,* the requirements relating thereto, *and the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the nation.*

"That the Council of National Defense shall adopt rules and regulations for the conduct of its work, which rules and regulations shall be subject to the approval of the President and shall provide for the work of the advisory commission to the end that the special knowledge of such commission may be developed by suitable investigation, research, and inquiry and made available in conference and report for the use of the council; and the council may organize subordinate bodies for its assistance in special investigations, either by the employment of experts or by the creation of committees of specially qualified persons to serve without compensation, but to direct the investigations of experts so employed."

The Council of National Defense is to be organized at once.

It cannot come too soon. There are many important questions related to national defense and public welfare to be considered by the Council.

The seven civilian members of the Council have not yet been announced, and possibly their selection has not yet been completed. As there are many important opportunities for the Council to exercise its power "for the coordination of industries and resources for the national security and welfare," and solve difficult economic problems, and to Council is to be a national clearing-house, it is to be hoped that it will be organized without delay, and that the seven civilian members will be men who have a national viewpoint, with thorough knowledge of the national situation, and this country's international relations.

The aeronautic movement needs the Council of National Defense badly, to establish the broad, cooperative national policy laid down by Congress in the aviation sections of the War and Navy Departments, so that these Departments may become cooperative bodies, doing their share in coordinating aerial resources, fostering the development of the aeronautic industry on a sound, economic basis, and build truly substantial aerial defenses.

So far the Aviation Sections of both the Army and Navy seem to have overlooked the fact that sufficiency is the first element of efficiency. At the end of eight years of army aviation and five years of naval aviation we have not even one hundred trained military aviators!

The country will not tolerate these conditions any longer, nor will it tolerate any longer a destructive attitude towards the National Guard and the aeronautic industry. These last are important factors, valuable sources of supply for the trained men and aeroplanes and equipment necessary to give this country the thousand aviators which the public has demanded and Congress has provided for.

Aerial Age advocated the Council of National Defense as early as June, 1915. It cannot come too soon.

Judge Advocate General of the Army Decides That National Guard is Entitled to Increased Pay for Aviation Service

The Judge Advocate General of the Army has decided that the National Guard is entitled to increase of pay for aviation service.

"The question was presented whether officers and enlisted men of militia organizations brought into the service of the United States are entitled, while on duty requiring them to participate regularly and frequently in aerial flights, to increase of pay for such service, the same as provided by statute for officers and enlisted men of the Regular Army.

"Held, that while the Aviation Section of the Signal Corps, provided for in section 16 of the National Defense Act, is prescribed for the Regular Army only, and officers and enlisted men of the National Guard are not eligible for detail to fill places therein, and while there is no corresponding Signal Corps or Aviation Section prescribed for the National Guard, there may be Aviation Squadrons, or unit parts thereof, in the National Guard of the several States as component parts of the 'complete higher tactical units' contemplated by section 60, idem, and the officers and enlisted men therein, will, when duly qualified, be entitled while in the actual service of the United States, or while attending encampments or maneuvres ordered by the Secretary of War, to the same pay and allowance as officers and enlisted men of corresponding grades of the Regular Army receive, including increase of pay while on duty requiring them to participate regularly and frequently in aerial flights."

Judge Advocate General of the Army's Decision Regarding Commissioning of Aerial Reserve Corps

The second paragraph of section 37 of the National Defense Act authorizes the President to appoint and commission as reserve officers in the various sections of the Officers' Reserve Corps, in all grades up to and including that of major, such citizens as shall, upon examination, be found qualified to hold such commissions.

The Judge Advocate holds "that the Signal Corps proper and the Aviation Section each constitutes a corps which should form the basis of an organization in the Officers' Reserve Corps, the lowest grade in the Signal Corps being that of first lieutenant. As to the Aviation Section, held, that the grade of aviator, provided for in section 13 of the National Defense Act, was created as a means of meeting contingencies and supplying casual deficiencies, and should be regarded as temporary and not as a permanent grade or integral part of the Aviation Section, such as should be made a basis for appointments in the Officers' Reserve Corps, but the lowest grade of the Aviation Section in which an unlimited number of officers may be appointed is that of first lieutenant."

Canadians to Have 500 Aviators and an Aviation Bureau

Charles Seward Wilcox of Hamilton, Ont., a member of the Canadian Parliament and of the Munition Board of Canada, is soon to be appointed Air Minister in charge of all Governmental aeronautic development in the Dominion of Canada. He will devise the ways and means for obtaining the 500 military aviators, which is to be the peace footing of the Canadian Air Service.

Canada has supplied 450 aviators to England since the beginning of the war.

Aviation developments have gone rapidly in Canada during the last few months, and the various authorities are showing deep interest in the science. Major Gen. Logie, commandant of Camp Borden, recently made a flight with Victor Carlstrom, the American long-distance flier. This was his first flight and he expressed himself as much impressed with the need of aeroplanes for military use. Gen. Logie is 63 years old, and has been in charge of Camp Borden ever since its establishment. On the same day, Carlstrom flew from Toronto, where one of the Canadian flying schools is located, to Camp Borden, a distance of sixty-eight miles, in thirty-five minutes. There are now 30,000 volunteers in training at the camp.

The Duke of Connaught, Governor General of Canada, is one of the keenest aviation enthusiasts there. A few days ago he paid a visit to the Long Branch Aviation School, of which J. A. D. McCurdy is in charge, and there went into details of the training being done by the men training there for the Canadian Air Service. His visit was made an official occasion and there were a number of Cabinet officers, military and naval authorities, members of Parliament, and other prominent Canadians to the number of about 1,000, who also visited the school.

During the inspection the training went on in the usual way. Then Lieutenant G. McLean, who has had eight months' service at the front, and is one of the instructors at the school, went up in a ninety H.P. J. N. Biplane, and gave a fine demonstration of looping the loop, looping six times in succession from a height of three thousand feet. After that he give a demonstration of the swift dodging that an airman must do to dodge shells while on reconnaisance or artillery spotting duty over the enemy's lines. To prevent the enemy from getting his range the aviator must zig-zag through the air, continuously changing direction of flight.

Ladies and gentlemen who attended the inspection were highly pleased and the general consensus of opinion was that Canada must concentrate its efforts on getting a Canadian Air Service of 500 aviators as soon as possible.

Mr. W. Earl Dodge to Train Sixteen College Men

MR. W. EARL DODGE, the millionaire sportsman, member of Phelps, Dodge & Company, has decided to establish an aviation training camp for training college men in aviation for national defense, and has requested the Aero Club of America to select sixteen college men to be trained, beginning with November 1.

The college men who will be trained free of charge must be under twenty-five years of age and physically fit.

Mr. Dodge's aviation training camp is to be established at Jacksonville, Fla., during the winter and will be moved to Long Island in the spring.

Being deeply interested in aviation work and in national defense, Mr. Dodge established an aviation camp at Newport early in the summer and has flown himself during the summer and recently made a flight from Newport to New York and back in his flying boat.

At the Newport camp Mr. Dodge had three aeroplanes. At the Jacksonville camp he will have several land aeroplanes and two Curtiss flying boats.

Mr. Frederick C. Eden, one of the best aviators in this country, who has charge of the flying for Mr. Dodge, will be in charge of the instruction of the college men.

The Aero Club is inviting college men to make application for the free aviation training offered by Mr. Dodge and as soon as it receives the necessary number of applications it will submit them to Messrs. Dodge and Eden who will select those who are to receive the training beginning with November 1.

At the conclusion of this training the college men will be ready to enter the Army aviation schools if they so elect and thereby make a valuable addition to our aerial defenses. Prospective candidates should address their applications to the Aero Club of America, 297 Madison Avenue, New York City.

THE NEWS OF THE WEEK

Navy to Ask Bids for Huge Dirigible

The Navy Department, it is reported in the press, soon will send out specifications calling for sealed bids for the construction of a huge dirigible. The balloon will be of the general Zeppelin type, probably 500 feet or more in length and of great power.

The most interesting thing about the proposed dirigible is that Department officials are assured that at least three or four concerns in the country are prepared to build such a craft.

Balloon Races in October

Announcement is made that a Balloon Race is to be held, starting from Muskogee, Okla., October 7th.

Mr. A. B. Lambert, a governor of the Aero Club of America, who has been at Narragansett Pier for some time, is due in New York and will take up the matter of securing the sanction.

Mr. T. Bixby, editor and publisher of the *Daily Phoenix*, also president of the Oklahoma Free State Fair, is anxious to pull off a race from their city and grounds October 7th, the last day of the Fair. Mr. H. E. Honeywell has investigated the gas facilities and found they have an abundance of natural gas, with a specific gravity of 6/10 which is much better than Wichita had last year.

The Fair Association is to place a certified check of $1,200 in the bank for five entries, and $250 for each additional up to eight, the whole to be potted, out of which each pilot will receive $100 expense money prior to the start and the ballance to be divided in four prizes, as follows: 1st prize, 40 per cent and a cup; 2nd prize 30 per cent; 3rd prize 20 per cent and 4th prize 10 per cent. The gas, sand and labor will be given free.

Entries will close October 1st.

Navy Receives First of 30 Aeroplanes

Secretary Daniels announced that the first of thirty naval aeroplanes contracted for has been delivered, and is now being tested at Newport News, Va. The last will be delivered to the Government by November 1.

Navy Airmen Break Records

Reports from the Atlantic fleet on the Southern drill grounds stated that naval airmen, despite unfavorable weather conditions, made remarkable records September 22 with bombs and aeroplane guns from flying boats at an elevation of 2,000 feet.

Two airmen with gunners ascended from the North Carolina, carrying twelve bombs, small aeroplane rapid firers and small arms. Nine of the twelve bombs were successfully dropped on targets, doing great damage.

Paint marks on a canvas target, representing men, were hit by rapid fire guns and sharpshooters.

American Hispano-Suisse Motors Being Tested

Two of the first five Hispano-Suisse motors manufactured by the Wright-Martin Co. are being tested at date of writing and are giving splendid results. At a speed of 1,400 r.p.m. the motor develops 158 horsepower. The French have been running the Hispano-Suisse at a speed of 1,600 r.p.m., therefore it is evident that the American-made motor is an improvement on the French.

Goodyear Kite Balloon Travels 120 Miles

The kite balloon, presented by the Goodyear Tire & Rubber Co. to the Ohio National Guard, made a trip from Akron to Washington, Ohio, on September 23, a distance of 120 miles.

The balloon was piloted by C. H. Roth and C. A. Wollen, of Akron, and made the trip in three hours and forty-five minutes.

Navy Needs Zeppelins for Scout Use, Says Daniels

Secretary of the Navy Daniels is convinced that the United States Navy needs at least one modern dirigible of the Zeppelin or rigid type. Discussing the uses to which such an aircraft will be put when it is built for the Navy, Mr. Daniels said:

"The Zeppelin or Zeppelins could be used at various stations along both coasts, at advance bases in the Caribbean, at the Guantanamo supply base, on the Panama Canal Zone and in the insular possessions. Zeppelins are able to remain aloft once they leave their hangars. They can travel at great speed or go slowly, giving them a distinct advantage over aeroplanes for scouting work. They can travel along with the fleet, no matter what its speed."

Rear-Admiral Peary Praises Franco-American Aviators

Rear-Admiral Robert E. Peary, who is one of the two or three Americans who are "Grand Officier" of the Legion d' Honneur, and was guest at the France-America Lafayette dinner on September 6th, praised the Franco-American aviators who are participating in this war.

Mr. James M. Beck, the toastmaster, who had just returned from Europe, stated that aerial supremacy is the key to success in the war. September 6th, besides being Lafayette's birthday, is the anniversary of the sending by Admiral Peary of the wireless despatch announcing to the world, "Stars and Stripes nailed to North Pole."

Army Department to Buy Anti-Aircraft Guns

The War Department, according to press despatches, is ordering a large number of new type anti-aircraft guns especially adapted to high-angle firing. The new arm is declared to be the most effective anti-aircraft gun in the world and combines all the features found desirable as a result of the war.

Mr. E. J. Wendell, of the Aero Club of America, about to start on a flight at Toronto, Canada. On the right of the picture, Mr. Alan R. Hawley in conversation with Mr. J. A. D. McCurdy.

Hall-Scott Type A-5 power plant installed in latest Martin Army tractor.

Pennsylvania News

Lieut. Col. George O. Squier, chief of the Aviation Division of the Army, will lecture on Army aviation at the Franklin Institute, Philadelphia, October 5.

On the evening of October 13 a paper will be presented on "Navy Aviation" under the auspices of the American Society of Mechanical Engineers at the Engineers' Club, Philadelphia.

Joseph A. Steinmetz will lecture on "Aerial Warfare" at the Engineers' Club, October 26.

Mr. Howard Huntington, formerly secretary of the Aero Club of America, and now chief designing engineer of the American Aircraft Corporation, will deliver a lecture on "Aeroplane Engines" under the auspices of the American Society of Mechanical Engineers at the Engineers' Club, Philadelphia, on November 28.

The delegates to the Inland Waterway Convention, who assembled at the League Island Navy Yard on September 15, witnessed a thrilling exhibition by two submarines and a hydroaeroplane. While one of the submarines was submerging and being convoyed by steamer to Chester, a hydroaeroplane from the Philadelphia School of Aviation appeared, flying at about six hundred feet altitude; circling the convoying steamer, it glided to the water's surface alongside the delegates' boat, accompanying it for several hundred yards. Secretary of the Navy Daniels whose address was interrupted by the arrival of the plane, paused to say that he "Would never be satisfied until there were ten machines like that attached to every dreadnought, and as I have never talked against a flying machine, I shall not do so now."

Personal Pars

Pietro Maraschi, formerly chef of the Palace Hotel in San Francisco, has just qualified for his pilot's license at the Christofferson Aviation School, Redwood City, Cal.

Aviator Fred de Kov fell with his machine while making an exhibition flight at Bethany, Mo., September 15. He was severely injured.

Miss Ruth Law flew at the Olmsted County Fair, Rochester, Minn., September 26-28.

Army and Navy Orders

Maj. Benjamin D. Foulois, aviation officer, Signal Corps, now on leave of absence to Washington, September 30, for duty in office of officer in charge aviation section of Signal Corps.

First Lt. Ira A. Rader, aviation officer, Signal Corps, from duty with 1st Aero Squadron, Signal Corps, Columbus, N. M., to Mineola, L. I., and report to officer in charge Signal Corps aviation station for duty.

Second Lts. Davenport Johnson, 19th Infantry; Millard F. Harmon, Jr., 27th Infantry; Clinton W. Russell, 8th Infantry; Howard C. Davidson, 27th Infantry, and Maxwell Kirby, 3d Cavalry, aviation students, Signal Corps, from Aviation School, San Diego, to Columbus, N. M., for duty with 1st Aero Squadron.

Col. Samuel Reber, Signal Corps, will report to Brig.-Gen. George P. Scriven, Chief Signal Officer, to determine fitness for promotion.

The following named aviation students, Signal Corps, are relieved from duty at Signal Corps aviation school, San Diego, to Columbus, N. M., for duty with First Aero Squadron: Second Lieuts. Davenport Johnson, Nineteenth Infantry; Millard F. Harmon, Jr., Twenty-seventh Infantry; Clinton W. Russell, Eight Infantry; Howard C. Davidson, Twenty-seventh Infantry, and Maxwell Kirby, Third Cavalry.

Second Lieut. John W. Leonard, Sixth Infantry, to Fort Sam Houston, Texas, for examination to determine his fitness for detail in the aviation section of the Signal Corps.

First Lieut. Clarence Gunter, M. R. C., from duty in the Southern Department to his home. First Lieut. Henry McClure Young, M. R. C., to active duty Fort Leavenworth, Kansas. Second Lieut. F. J. Zerbee, Coast Artillery Corps, is attached to the Signal Corps for temporary duty Southern Department. First Lieut. Joseph E. Carberry, aviation officer, Signal Corps, to Stapleton, Staten Island, N. Y., for temporary duty in connection with the inspection of the Wittemann Aircraft Company. Second Lieut. William B. Peebles, Tenth Cavalry, is attached to the aviation section of the Signal Corps as aviation student, and will proceed to San Diego for duty.

Lieut. Haller Belt, Junior Grade, from works Sperry Gyroscope Company, Brooklyn, N. Y., to receiving ship at New York in connection fitting out the Arizona and on board when commissioned.

Third and Fourth Aero Squadrons

Preliminary plans have been made toward organization of the third aero squadron at San Antonio, Tex. The new unit will be known as the Third squadron.

The squadron is intended for service in this country and will be equipped with six Curtiss biplanes with twin ninety horsepower motors. The six planes have been ordered, but only one has been received by the Government and given practice trials. The other five are expected in a few days.

Fort Sam Houston was designated as an aero station several months ago when the first squadron was ordered there from Fort Sill, Okla. Major Foulois, then a captain, was in command of the squadron and made a flight from the Fort Sill station to Fort Sam Houston.

Following the organization of this squadron, the fourth aero will be organized. Probably it will be equipped with battle aeroplanes armed with one machine rifle and two Winchester automatic shoulder rifles. On the basis of plans made for furnishing reserve machines, twenty-four more of the battle aeroplanes will be required for the squadron.

Massachusetts Militia Camp a Success

The aviation camp of the Massachusetts Militia on Mystery Island was a great success.

During the first week a total of about sixty flights took place. Four machines were available for the work, all of them coming from the Burgess Company. Godfrey L. Cabot owns one of these and Norman Cabot and George R. Fearing a second.

(*Continued on page* 74)

The Wright hydroaeroplane, built for the U. S. Navy, preparing for tests at Pensacola.

A SPECIAL BAROGRAPH FOR AEROPLANES

As the aeroplane is quick in its movements, when a barograph reading of its movements is desired it is obvious that a barograph with mechanism for recording every movement is essential. The cylinder of the old-style recording barograph, still used on aeroplanes, makes one revolution in from *six to twenty-four hours.* Now, as about 75 per cent. of the flights made in this country are not more than half an hour in duration, the recording cylinder on such occasions makes but a small fraction of a revolution, and the reading obtained will not, of course, show much more than the altitude reached.

The chart reproduced here is from a quick-acting recording barograph, manufactured by A. Haustetter, of New York. In this instrument, the cylinder is made to completely revolve in one hour. The record of a 30-minute flight is shown by the graph "A," and it will be noted that the graph extends half way across the chart. In addition to showing that the aviator reached a height of 5,000 feet and that the flight lasted 30 minutes, every dip and rise is faithfully recorded.

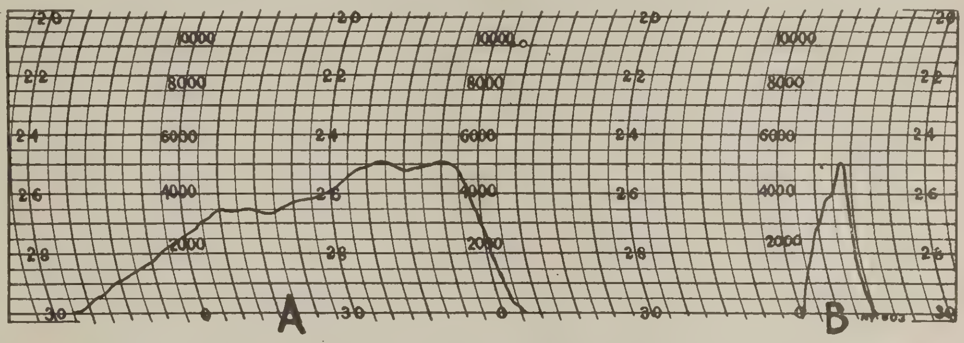
By comparison, the graph "B," drawn on the same chart, shows the record that would have been produced if the old style barograph had been used on the same flight. In 30 minutes the graph would have traveled but a short distance horizontally, showing the altitude and the time elapsed, but failing to indicate anything when slight dips were made.

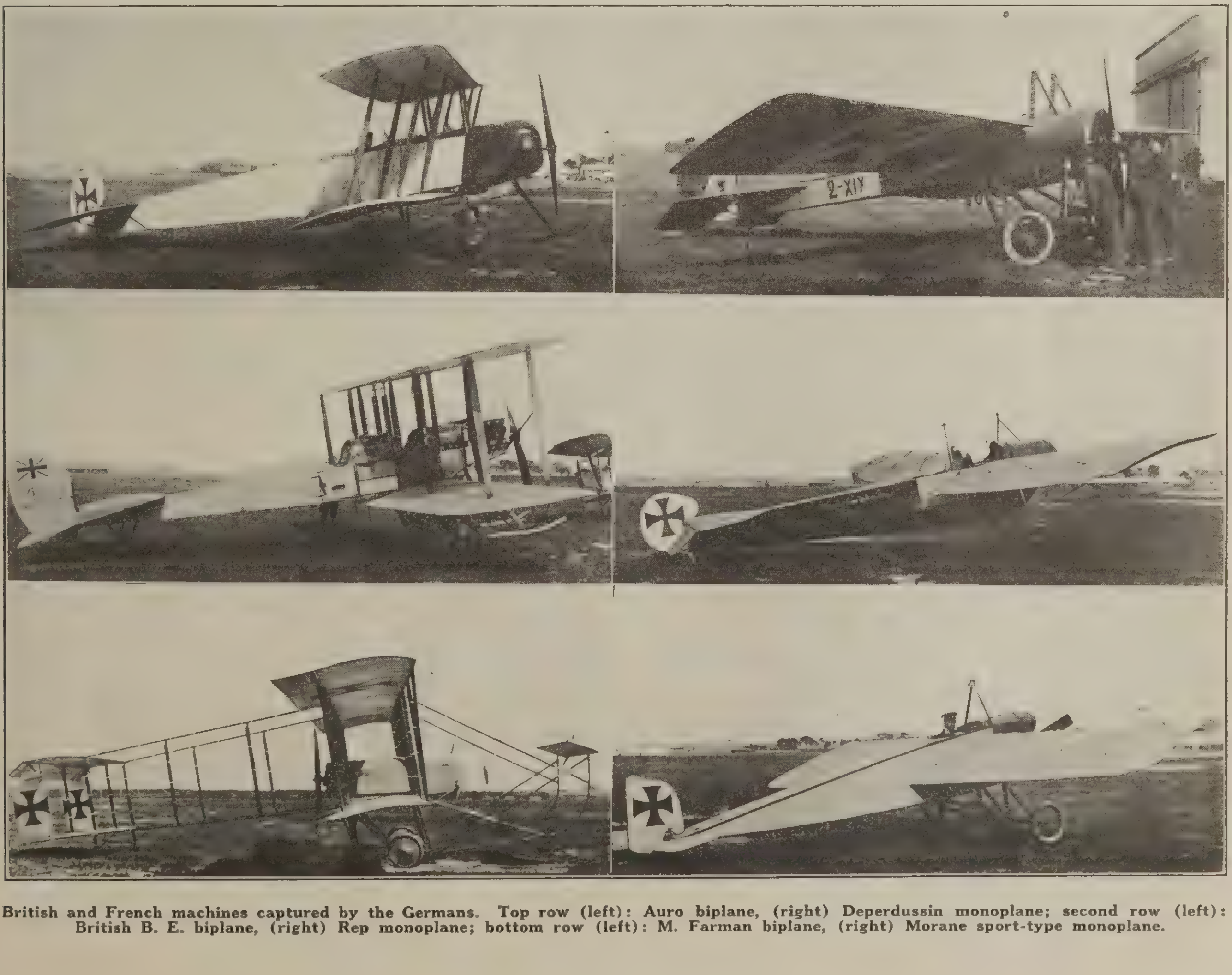
The new instrument is an ideal one for school work, as it will show the actual climb at different altitudes, and by studying the charts the teacher can point out to a pupil the exact points where an improvement can be made in his flying, and comparisons of the charts will show just what improvement is made by the pupil. In the August 21st number of AERIAL AGE, Mr. Alan R. Hawley, President of the Aero Club of America, pointed out the need of just such an instrument as this.

Comparative records of a half-hour flight.

A—The new Haustetter Barograph.

B—Old style barograph.





British and French machines captured by the Germans. Top row (left): Auro biplane, (right) Deperdussin monoplane; second row (left): British B. E. biplane, (right) Rep monoplane; bottom row (left): M. Farman biplane, (right) Morane sport-type monoplane.

FOREIGN NEWS

AUSTRIA HUNGARY

The exploit of Austro-Hungarian aeronauts who, with two seaplanes, rescued twenty-nine men, the officers and crew of the French submarine Foucault, is described by the *Tageblatt*. Official announcement was made at Vienna of the sinking of the Foucault by an Austrian seaplane in the Southern Adriatic.

The sea was rough at the time and there was also danger that the Austrian aeronauts would be captured by hostile warships, as well as that the aeroplanes, overloaded by taking on board so many men, might collapse. Nevertheless, the Austrian aviators told the men from the French submarine to swim to the seaplanes and take hold of them. The commander and second officer of the submarine were allowed to climb into the pilots' seats.

The aviators signaled for help, and half an hour later a torpedo boat arrived and took on board the men from the submarine.

FRANCE

Kiffin Rockwell, of the American air squadron, was killed near Thann on September 23 in an air battle with a German. The news came by telephone from a French captain of aviation to Rockwell's brother and aunt, living in Paris.

The only details obtainable concerning his death are that he was probably killed in the air. He fell within the French lines and his body was recovered. Funeral services will be held at Luxeuil on Monday.

Rockwell enlisted in the French Army at the beginning of the war as a private in the Foreign Legion. He was wounded in Artois more than a year ago, and afterward entered the aviation corps, where he became one of the most popular members. He held the rank of Sergeant, but was proposed for Lieutenant a few weeks ago, when he brought down his fourth German over Verdun, just before the Americans were transferred from that sector to Alsace. He had received the Medaille Militaire and the Croix de Guerre, with two palms.

French aviators engaged in fifty-six aerial combats on the Somme front September 22, as a result of which four German planes were destroyed and four others brought to earth.

The Germans brought down eleven machines on the Somme front, while British aviators destroyed three and drove to earth five others.

Along the whole Western front both French and British fliers displayed great activity in bombarding hostile railroad stations, aerodromes and military works. One French airman flew 100 miles beyond the German border and shelled important works at Ludwigshafen and Mannheim, on the Rhine, causing fires and explosions.

The French official account of aerial operations says:

"On the Somme front French aviators delivered during the day of September 22 a total of fifty-six aerial combats. As a result of this activity four enemy aeroplanes were destroyed, while four others were seen falling disabled.

"French aviators engaged in throwing bombs also have displayed great activity along the entire front. In Belgium one of our fliers has thrown down four bombs on the barracks in the Forest of Hauthulot. In the region of the Somme a detachment of sixteen French aviators have bombarded the railroad stations of Fins, Epehy and Roselet, and also the aviation ground at Hervilly. On these four points eighty shells of 120 millimetres were thrown. To the northeast of Soissons an automobile station of the enemy received twenty shells.

"Also, during the night of September 22-23, a French dirigible bombarded the railroad tracks in the region of Marcoing, to the southwest of Cambrai.

"Warrant Officer Baron, accompanied by a bomb thrower, left his aviation camp yesterday evening at 7:15 o'clock and headed for the Rhine. They arrived at Ludwigshafen and threw down three bombs on military establishments in this city. Then, continuing their flight, they threw down three more missiles upon a large factory at Mannheim, on the right or east bank of the Rhine. They observed the outbreak of a large fire and heard several explosions. They returned to camp this morning."

GERMANY

Captain Boelke, Germany's most famous aviator, last week brought down two enemy aeroplanes, making his total number twenty-eight since the beginning of the war.

A Naval plane squadron successfully dropped eight heavy bombs on the railroad station at Mestre on the night of September 18. Numerous hits were observed on the station and building. In spite of violent shelling, the aeroplanes returned unharmed.

Mestre is an Italian town 5 miles northeast of Venice.

The French submarine Foucaus has been sunk in the Southern Adriatic by bombs dropped from Austro-Hungarian naval aeroplanes, the Austrian Admiralty announced. The entire crew of twenty-nine men were rescued and made prisoners. The Admiralty statement reads:

"An Austro-Hungarian naval aeroplane in the Southern Adriatic sank, by means of bombs, the French submarine Foucaus. The aeroplane's pilot was Lieut. Celezeny and the observer was Lieut. von Klimburg. The entire crew of the submarine, comprising two officers and twenty-seven men, many of whom were in a drowning condition, were rescued and made prisoners by the naval aeroplane mentioned and by another piloted by Lieut. Komjovec, with Cadet Severa as observer.

"Half an hour later the imprisoned crew was taken over by a torpedo boat, while the two officers were transported to land on the naval aeroplanes."

"German seaplanes on September 20," says a report issued by the German Admiralty, under date of September 21, "successfully attacked with bombs two Russian ships as starting places for aeroplanes, which, escorted by one cruiser and several destroyers, approached the Bulgarian coast near Varna. The hostile sea forces were compelled to retire and were pursued by our seaplanes.

"German hydro-aeroplanes later successfully attacked hostile transport steamships at Constanza and dropped bombs on the railroads in Northern Dobrudja. In spite of heavy shelling all the raiders returned."

No French submarine Foucaus is listed in available naval records. The craft sunk probably was the submarine Foucault, built in 1912 at Cherbourg. She was 167 feet long, 16.3 feet beam, with a speed of 12.5 knots above water and 8 knots submerged. She was equipped with six torpedo tubes. Her complement is given as composing 24 men.

The French submarine Foucault on January 14 of this year was reported in Rome to have sunk an Austrian scout cruiser of the Novana type in the Adriatic. On January 16 the Overseas News Agency, a semiofficial organization in Berlin, reported that no Austro-Hungarian ship was missing, and added: "The Foucault must have sunk a ship of the Entente powers by mistake."

GREAT BRITAIN

Of the twelve big Zeppelins which raided England on Saturday night, September 23, to deal death and destruction from the skies, two were brought down by the highly improved defenses of London and outlying counties. One came down a flaming torch like its predecessor, the L21, destroyed three weeks ago, while the crew of the other effected a landing and were captured.

The death and burning of the former was witnessed by tens of thousands of London residents, but the bringing down of the other was a matter of doubt until the official reports were given out. The booming of the land defenses was offset by the sharp report of the machine guns of many aeroplanes which went aloft to do battle with the huge monsters.

More than thirty people were killed and over a hundred wounded before the raid was abandoned.

The fact that the Zeppelins were brought down well outside of London both on September 23 and September 3 shows the care with which the air defenses have been perfected. The efficiency in dealing with the raiders is shown by the speed with which the searchlights picked the Zeppelins out of the sky.

The official English report of the raid follows:

"Latest reports show that probably not more than twelve airships participated in last night's air raid. Police reports from the provinces indicate that the damage by the airships is slight. In one town in the East Midlands, however, a number of bombs were dropped, and it is regretted that two persons were killed and eleven injured. It is feared that two more bodies were buried under some ruins in this town.

"Some damage was caused at a railway station and about a dozen houses and shops were wrecked or damaged and a chapel and storehouse set on fire. This is an exception. No other casualities have been reported outside the metropolitan area, and althouh a large number of bombs were dropped promiscuously over the districts visited by the airships the material damage is insignificant. A great number of bombs fell in the sea or in open places.

"In the metropolitan area seventeen men, eight women and three children were killed and forty-five men, thirty-seven women and seventeen children were injured.

"A considerable number of small dwelling houses and shops were demolished or damaged. A number of fires were caused. Two factories sustained injury. Some empty railway trucks were destroyed and a permanent way was slightly damaged in two places.

"No reports have been received of any military damage."

An official statement issued soon after noon yesterday said:

"12:15 P. M.—Fourteen or fifteen airships participated in the attack on Great Britain last night. The southeastern, eastern and east midland counties and Lincolnshire were the principal localities visited.

"An attack on London was carried out by two airships from the southeast between one and two A. M. and by one airship from the east between twelve and one A. M. Aeroplanes were sent up and fire was opened from anti-aircraft guns and defenses, the raiders being driven off.

"Bombs were dropped, however, in the southern and southeastern districts, and it is regretted that twenty-eight persons were killed and ninety-nine injured.

"Two of the raiders were brought down in Essex. They were both large airships and of a new pattern. One of them fell in flames and was destroyed, together with the crew. The crew of twenty-two officers and men of the second were captured. Detailed reports of the casualities and damage have not yet been received."

HOLLAND

Surrounded by warring nations, Holland has not been standing still in the matter of aeronautical equipment for her fighting forces. Quite a number of aeroplanes are in use in Holland, the majority of these closely following the lines of the H. Farman, but built by the Spijker Works under the direction of the well-known Dutch aviator, Henry Wijnmalen. Eight of the machines built in Holland were recently piloted in a circuit race from Soesterberg to Gilze, Rijen, Scheveningen, and back to the starting point. It is reported that military machines are constantly engaged in cross-country flights, flying in escadrille formation. Whereas a single machine would have been seen in the air a few months ago in the rural districts, fleets of machines are now common.

The Dutch mail steamer Prins Hendrik, which was seized by German naval forces while bound from Flushing for London and taken into Zeebrugge, was in danger when, as the steamer was being escorted toward that port for the second time, an allied aeroplane dropped a bomb, intended for a convoying German destroyer, within twenty feet of the vessel, wounding one Dutch passenger and two sailors. This is the story told by passengers of the Prins Hendrik.

Herbert C. Hoover, chairman of the American Commission for Belgian Relief, was standing beside the wounded passenger and had a narrow escape from injury. The hull of the vessel was punctured in twenty-three places.

The only belligerent who avoided capture and detention was a 19-year-old French soldier, Armed Schran, who had escaped from a German prison camp. He remained for five hours in a wooden tub which had the open end propped against the deckhouse. Among the escaped prisoners captured were one French and one Russian officer.

The Prins Hendrik on her final trip out from Zeebrugge was escorted in addition to destroyers, by three German aeroplanes, the pilots of which amused themselves by shooting wild ducks with their machine guns.

MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz

CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

The Dowd R. O. G. Model

The Dowd R. O. G. Model is a large twin pusher of the main-plane-ahead type embodying many original features of design and construction which produce an appearance somewhat different from that of the average rubber-powered model.

FUSELAGE—The chief characteristic of the fuselage is the complete inclosure of rubber strands. This is accomplished by the use of hollow motor bases, 41 inches long and ¾ inch square. In the detailed section the rubber strands are indicated by the dotted circle. Very thin pine is used in the construction of the spars which are shellaced and polished. They are bound with thread at the front to strengthen them for the motor fittings. A small triangular block at the apex serves to brace the frame while the two members of the tail plane act as the only cross braces.

PLANES—The main plane has a fairly high aspect ratio with a span of 41½ inches and a chord of 6 inches, which give an area of about 1.68 square feet. This plane, which is of the section of Eiffel wing No. 32, is double surfaced with "Avion" paper and set at an angle of 6° with the fuselage. The forward spar, which is the entering edge, is shaped to conform with the wing section. The rear spar is flat and is inserted through slots in the ribs. The ribs are cut to shape, flattened in front to butt against the front spar and drilled to decrease weight. The plane is attached with dress snaps to two light streamline plane-hangars which are held securely beneath the plane.

The first tail plane is non-lifting, with an area of about .25 square feet. It is built around the cross braces of the fuselage and has one rib in the center.

PROPELLERS—The two propellers at the rear are true screw with a diameter of 12 inches, and a pitch of 20 inches. They are readily detached from the hooks by removing a pin which passes through a hole drilled in a slightly flattened section of the shaft which is of 3/64-inch brass spring wire.

The propellers are each driven by fourteen strands of ⅛-inch flat rubber which give a static speed of 800 R.P.M. and a very slight increase in speed dynamically.

KEEL SURFACES—The vertical keel in the rear has an area of about .20 square feet and is guyed with fine wire.

The forward fin, which is adjustable for steering, is held on a mast set in the triangular block at the front of the fuselage. This fin, although not included in the original design, was found necessary in practice to prevent spiraling caused by the large keel surface in the rear.

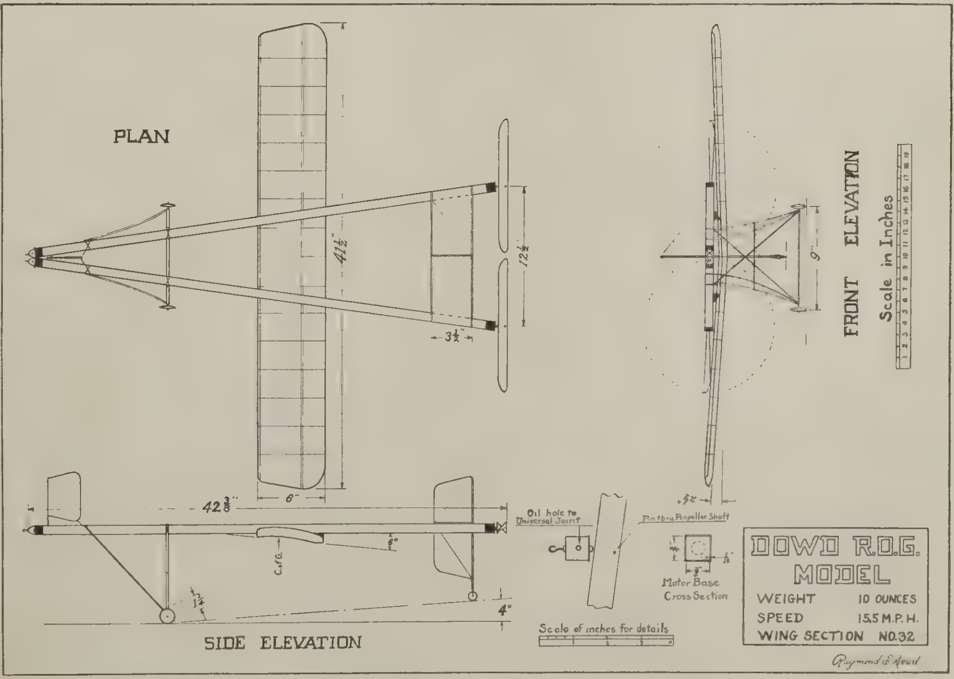
CHASSIS—The landing gear which holds the model at an angle of 4° with the ground is formed of ash compression members and bamboo tension members cut in stream-line form and held with thread and glue.

The wheels are cut from pine and are 1¼ inches in diameter. The rear wheel is ¾ inch and is held in a fork of brass wire on the rear extension of the keel. Cross bracing with fine wire gives ample strength to withstand the severest shocks encountered in landing.

BEARINGS—The rubber is held at the forward end on wire hooks passing through stream-lined blocks where they are formed into hooks for attachment to a winder. A pin through this wire prevents the wire from turning in the blocks.

In the rear block is set a small universal joint which allows the propellers to turn at right angles to the line of flight, thus obtaining the maximum effective thrust.

FLIGHT—The model rises from the ground after a short run, all three wheels getting off together. It climbs steadily without stall since its flying angle is only 4° less than its angle when on the ground. The flight is firm and steady owing to the high degree of inherent stability in the Eiffel No. 32 wing. As a result of careful elimination of head resistance, the model attains the relatively high speed of 15.5 miles per hour. The total weight is 10 ounces, so that the model carries roughly .27 pounds to the square foot, considerably above the average for rubber-driven models of the flying stick type. The average length of flight is slightly under 1,000 feet with a duration of one minute from 800 turns of the propellers.



ATLANTIC AIRCRAFT CO.'S BATTLEPLANE

Recent tests at Minneola have demonstrated this twin-motored tractor to be capable of going through all the performances expected of it. Its designer, Mr. A. S. Heinrich, has had a wide experience as a designer and pilot, and the twin-motored tractor is a result of his practical experience and ability.

As the fuselage projects well forward of the planes, a machine gun mounted on the nose is permitted a wide arc of fire. One of the tests at Minneola consisted of carrying a torpedo below the fuselage, which could be released at the will of the observer. The nature of the landing gear gives a good deal of clear space below the fuselage, affording an ideal location for suspending and releasing aerial torpedoes of large size.

General Dimensions

Top and bottom span	48 ft. 0 in.
Chord	6 ft. 0 in.
Gap	7 ft. 0 in.
Length over all	28 ft. 6 in.
Height	11 ft. 0 in.
Area, main planes	550 sq. ft.
Area, stabilizer and elevators	60 sq. ft.
Motors (2), 92 h.p. each	184 h.p.

Planes

The plan on the opposite page shows the arrangement and shape of planes. Struts are of three laminations, bound with cord at the centers and near strut sockets. All strut members are finely streamlined.

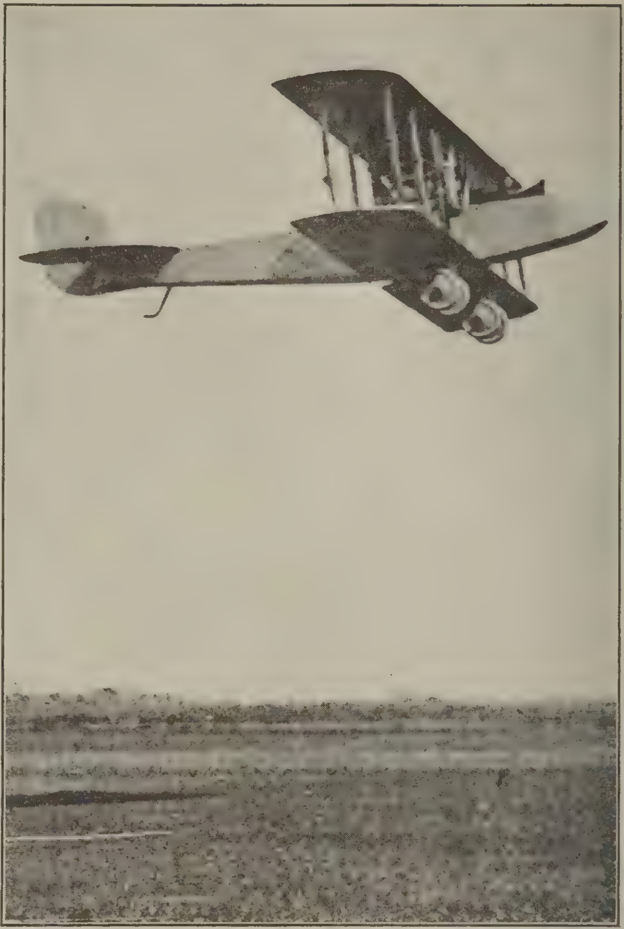
Ailerons have a total area of 100 square feet. Control cable runs along the top of the upper plane, and underneath the lower plane. Ends of control cables terminate in 3 cables which are carried over pulleys to each of the ailerons.

"Dep" control is used, with all cables run over ball-bearing pulleys, by means of which much friction is eliminated. The controls are well balanced and operate with surprisingly little effort.

Fuselage

Sides and bottom of the fuselage are flat. Top has a rounded deck, tapering to flat at the tail. Tail plane is supported by four oval steel tube braces which run from the bottom of fuselage. The rudder is balanced with about 2 square feet of surface forward of the pivot, and having in all a total area of 16 square feet.

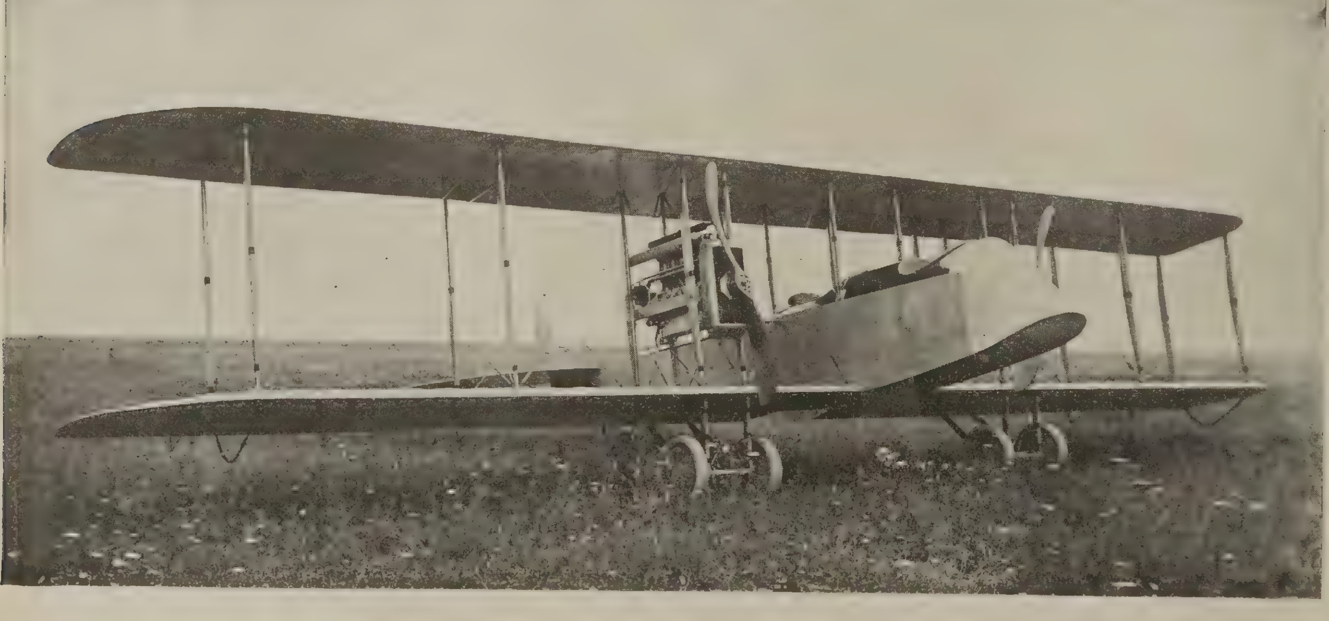
A passenger's or observer's seat is situated in the forward cockpit. The pilot and a passenger sit side-by-side, in the rear cockpit. Controls are operated from the seat, which, on the plan, is shown to be slightly forward of the other. This arrangement of seats gives the pilot freedom of arm movement.

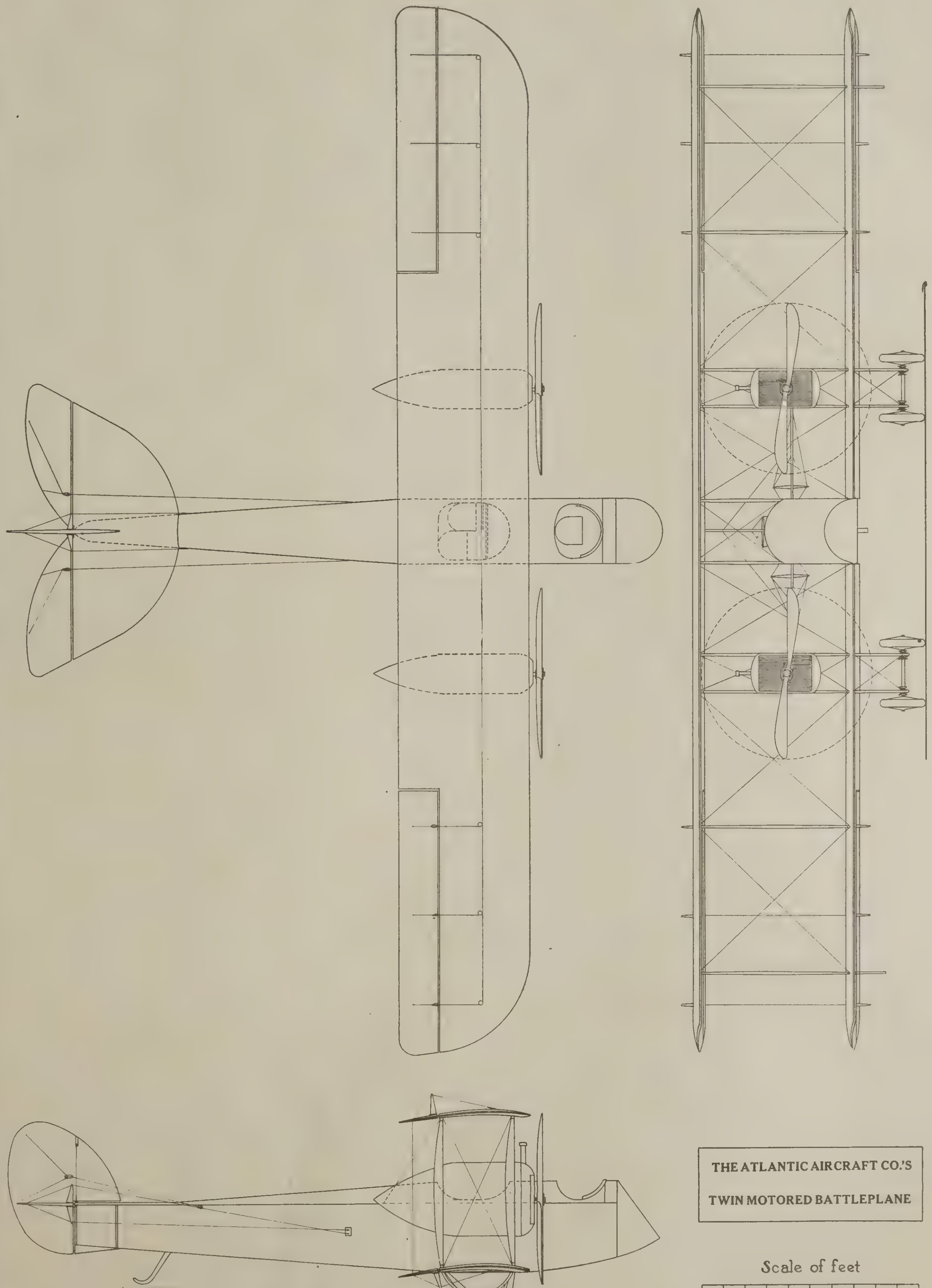


The twin-motored Atlantic Aircraft Battleplane in flight at Mineola.

The landing chassis consists of four wheels, a pair located under the motor carrying struts at either side. The tread over all, between each pair of wheels, is 15 ft. 6 in. Steel axles, 3 ft. 6 in. long, are bound to the landing strut members by rubber shock absorbers. The tail skid is fitted with shock absorbers located inside the fuselage. Semi-circular skids are placed under the lower plane at the outer struts.

(Continued on page 74)





THE ATLANTIC AIRCRAFT CO.'S
TWIN MOTORED BATTLEPLANE

McLaughlin

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

From Our Own Hashimura Togo

To the Editor of that Aerial Age:

Banzai! I am discharge from prison! For two months I linger in close confinement compleatly concealed with chains, handcuffs and iron balls. Then a idea strike me! Why should Hon. Japanese linger in jail with murderers, cutthroats, eloping bank presidents and rats? I shall imitate English women who desire votes but who get prison in exchange for breaking windows. With great strength of mind like man passing row of saloons, I shall refuse food and drink and jailer will let me out in great pity. (Reason for this are as follow: Expense for burying man dead from hunger are great. I suggest to Hon. jailer he report me dead and buried and collect expenses while I completely disappear from Japan.) Hon. Jailer agree. Hense I am out!

Maybe you notice that postmark from this letter are Russian Prison Camp. Too true! Here are reason for this. After escape from Japan all loyalty to country completely vanish and in place are much dislike for nobility and jails. (At this time I remark that Hon. American Jailing system are best for comfortable confinement.) After escape from Japan I make way to Germany with credentials which are not. (Meaning they are forge.) Upon arrive in Berlin I go at once to office of great German general whose name sound like peroxide gargle. He look at me for a while and then voice issue from behind foliage on face which are whiskers but look like spinach. Having work once in Milwaukee I easily understand German.

"You wish something?" he negotiate. "Commision," I reply. "Ah, this are not possible," he abdicate, "all commission are expended furnishing escape expenses for Germany Army." I blush with embarrasing! "Not money commision," I reply, "commission in Army as expert flyer with aviationing corpse." "You pronounce name wrong, *core* are pronunciation, do not give morgue accent."

"Pardon my familiarity," I sob, "no damage intended."

"You wish commision as aeroplane driver or Zeppelin?"

"Aeroplanes are no longer friendly to me," I correspond, "would prefer Zeppelin."

"But yes," he return, "what you know concerning gas?"

"For two days I listen to American Congress," I reply.

"Sufficient" (his answer). "Anybody who can listen to such proceeding deserve medal. You are engage as ballast for Zeppelin. This give great opportunity to sacrifice life for your country."

"While such were not my original wish," I return, "I am very spirit of bravery and will try it once."

"Men are not ballast more than once," he sob, "good bye, and what flours you like after death?"

With great dignity I scorn to reply and walk out with commision as aid on Zeppelin. I work on great balloon four days and Captain say, "Hashimura, we leave to-morrow on raid over those Russians who are cause of all this battle."

"Oh, such modesty on part of Kaiser," I nib, "to disallow credit like this!"

We leave at four A. M. the next morning and rising to great hight, steer in general destruction of Russia. "How we know when arrive?" I ask from man on Zeppelin. "Odor of Vodka," he reply.

In many hours we at last reach country which Captain says is Russia. Men begin dropping bombs from air to great general destruction below. Sudden many aeroplanes surround us, shooting bullets give out very disgusting sound when near ear. Then Zeppelin start to rise downwards in general direction of earth.

"Lighten ship!" command Captain.

"This are your opportunity," say man next to me. "As ballast you are expect to leave ship."

"As poets say opportunity knocks but once," I negotiate, "I do not hear the first knock, hense opportunity select some-one else."

"Such cowardice," he reply, "if such great chance were mine I should at once take advantage of it." "Very easy," I reply. "I will arrange for you to be brave with Captain by resign responsibility."

"No," he say, "I will not deprive you of such great chance to become hero. Over you go!"

With large lift he throw me over the edge and I fall for great distance through air until land on haystack in middle of Russian soldiers. "Welcome home," one of them say, "but what kind of German are this?"

"No German, but Hon Japanese," I respond.

"Memories of Port Arthur!" (From him) "Put him in irons" (Also from him).

And so after being in Russian Prison Camp for long time, I am still in it and after war maybe I get out. (Maybe not.)

However, in closeing I may say that I am getting used to prison life.

Hoping you are the same,
Hashimura Togo.
(Apologies to Wallace Irwin.)

P. S.—Please send Russian language instruction book. Must learn language if I wish to eat. H. T.

(The following is not our stuff,—we took it from the Saturday Evening Post. After 9 hours' careful study, we managed to get some sense out of it. Don't give up—it will come after a while.)

An L-e-g

Now ON loved sweet MLE,
And quite B9 was Fate,
B4 he did with NRG
SA 2 AV8.

He flew with EZ XTC,
Nor NE did XL.
A B caused him 1 day, ah, me!
2 DV8. He fell!

They gave 2 ON ODV
And XS OP8.
His brow grew IC, 4, U C,
Y then it was 2 late.

"O, ON," MLE did say,
"No more an NTT,
I NV even grim DK,
Your MT FEG."

"'Ave you fetched down many Zepperleans this morning?"

Curtiss

JN TWIN MOTORED TRACTOR

FLIES AND CLIMBS ON ONE MOTOR

A DOUBLE FACTOR OF SAFETY

Against Any Possible Forced Landing Is Gained by This Machine in Its Ability to Climb on One Motor

Recently piloted by Victor Carlstrom 661 miles, when equipped with pontoons, in 8½ hours in flights for the Curtiss Marine Trophy, making greatest mileage for this contest so far recorded.

THE CURTISS AEROPLANE CO.
BUFFALO, N. Y.

B. H. KENDRICK

WILL

INSTRUCT

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PALM BEACH, FLA.

ANNOUNCEMENT

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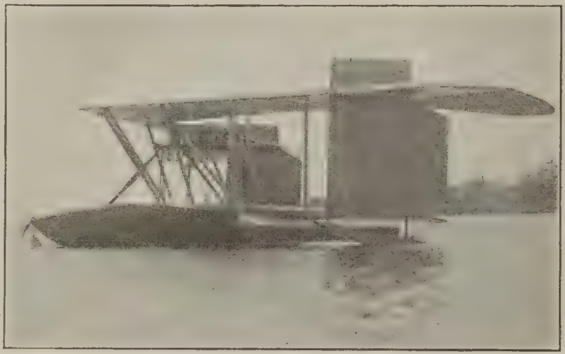


After conclusive tests the Burgess Company offers a water and air craft ideal for sportsmen.

Safety and comfort never before attained in flying is realized in this latest model, built under the patents of Burgess, Curtiss and Dunne.

The crew is seated in a steady, seaworthy hull, provided with wind and spray shields, deep cushions, lockers, and all the appointments of a modern high-speed launch.

Absolutely inherent balance is assured by the Dunne system, a balance as certain and simple as that afforded by the keel of a sailing yacht.

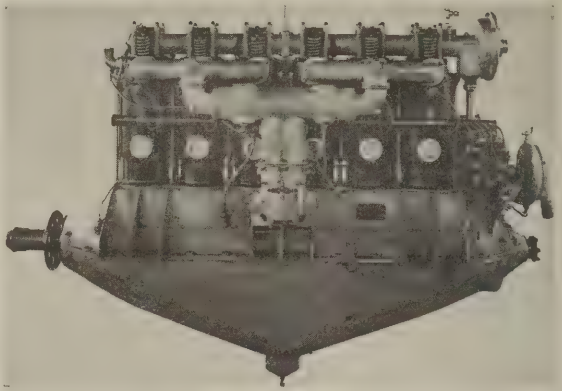
Steering is centered in a single wheel with duplicate control for pilot and passenger.

The engine may be started without leaving the cockpit.

The construction is worked out with a nicety of detail which must be seen to be appreciated.

THE BURGESS COMPANY, Marblehead, Mass.

Hall-Scott Aviation Motors



Constructors of aeroplanes cannot afford to select a power plant not possessing those refinements in design and construction which can only be obtained by manufacturers doing business on a large, steady production basis.

THE HALL-SCOTT AEROPLANE MOTOR FACTORY is producing at the present time more aviation motors per week than any three other manufacturers in the United States.

Such a production (which it is expected will not only continue, but greatly increase during the next two years), allows the use of three hundred skilled mechanics, each trained to do his individual part in the manufacturing, assembling and testing of Hall-Scott motors. It permits of systematizing to such an extent that each individual part may be subjected to a careful and rigid inspection after every operation through which it goes before completion. An elaborate and expensive testing department can be provided under such a production, whereby the complete power plants are given a most thorough and exhaustive test by Hall-Scott testers. These tests are witnessed, however, by expert engineers not connected with our company in any way. This insures each prospective purchaser that they will obtain a power plant that is up to Hall-Scott standard. A large experimental room is kept extremely busy with skilled engineers using their best efforts to perfect and improve our present motors. Other types are being assembled and tested by this department in order that the high standard set by Hall-Scott power plants today will continue to be upheld in the future.

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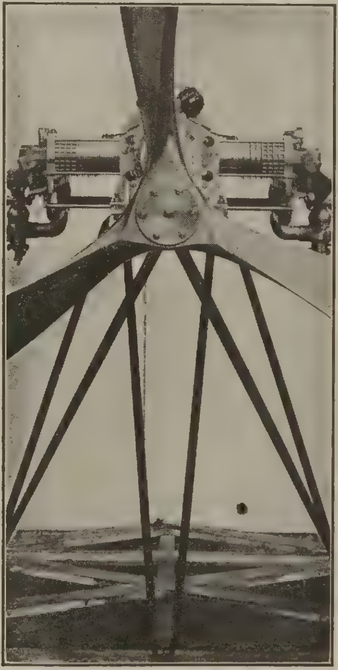
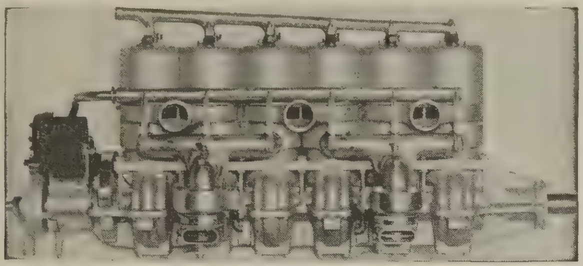


This photograph clearly indicates the small amount of head resistance of the entire power plant of the improved ASHMUSEN 12-cylinder, 105 H. P., self-cooled aeronautical motor as mounted on one type of standard.

Our new modern manufacturing plant is now producing these motors and the 8-cylinder, 70 H. P. motors exclusively and regularly.

Ashmusen Manufacturing Co.

266 Pearl St., Providence, R. I., U. S. A.



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6-X 100 H.P.
6-XX 165 H.P.
E-12 350 H.P.

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They combine to give added safety by absorbing most of the jolt and jar of landing; to give unusual freedom from tire trouble; and to work economies by giving the tire long life.

The tire is built up of layers of cords, running in diagonal directions and having no cross weave.

Thus it is given the flexibility and resiliency which enable it to absorb landing shocks without injury to aeroplane.

Goodyear Cord Tires are double tube clinchers, in various sizes up to 26x5 inches. The Goodyear Rim, light and strong, is made to fit these tires.

We make everything in rubber for the aeroplane and balloon.

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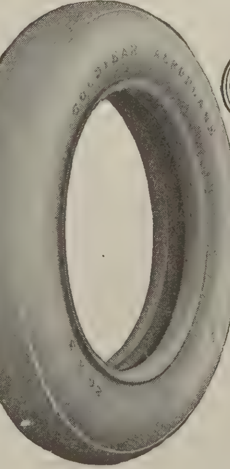

A third machine was the Burgess school machine, which was loaned for that purpose.

A fourth machine was a military type tractor equipped with pontoons which has just been completed by the Burgess Company expressly for use by the Bay State Militia. It was given to the organization by the New England Aero Club, which raised the funds for the purpose largely through the instrumentality of Godfrey L. Cabot, president.

Curtiss School Graduates 17 Pilots in Two Months

Seventeen students have successfully flown for their pilot's license at the Curtiss School at Buffalo during the past two months. These seventeen men include:

Harry H. Metcalf, Hamilton Coolidge, Edmond E. Bates, W. Bartlett Bacon, Frederic Stevens Allen, Francis I. Amory, Jr., Mahlon P. Bryan, Donald D. Harries, Robert H. Stiles, Joseph R. Torrey, 2nd, all Harvard students.

Lawrence Leon, Harmon J. Norton, Carl T. Batts, Frank S. Patterson, F. C. Cressman, J. D. Probst, Russell H Moore are the other students who have qualified.

There are still about 25 students at the school, nearly all of whom will be through within the next week or ten days.

Isla Tudor Dies of Appendicitis

Thirteen-year-old Isla Tudor, known on two continents as the youngest girl aviator, is dead at her home, No. 380 Rugby Road, Flatbush. Appendicitis was the cause.

Isla was the daughter of Mr. and Mrs. Harry Tudor. At the outset of the European war Isla and her father went to England, where the latter joined the aviation corps. She made many flights with him and soon became known as the "Little Air Lady." A machine was fitted with a dual control so she could pilot it.

Military Aviation News

Leave one month, about Sept. 2, 1916, to Brig. Gen. George P. Scriven, Chief Signal Officer. (Sept. 1, War D.)

First Lieut. Edgar S. Gorrell, aviation officer, S. C., to Boston, Mass., for the purpose of taking a post-graduate course in aeronautical engineering at the Massachusetts Institute of Technology. (Aug. 31, War D.)

The resignation by 1st Lieut. Harry Gantz, aviation officer, S. C., of his commission as an officer in the Army is accepted, Sept. 1, 1916. (Sept. 1, War D.)

Benjamin Thaw Visits Lieut. Thaw in France

Benjamin Thaw, who with Mrs. Thaw has been visiting their son, William K. Thaw, aviator in the French army, and who arrived here on board the Lafayette last week, told of his inspection of the aviation camp at Bar-le-Duc, where his son was stationed for a time.

"It was most interesting," said Mr. Thaw. "I saw 'Bill' flying out with the other aviators on their regular morning and evening patrols. Those boys fly like perfect machines. 'Bill' is flying with a stiff elbow, too, where a German bullet nicked him.

"He met us at Bordeaux when we went over," Mr. Thaw continued, "and went to Paris with us on furlough. Then when it came time for him to go back to his work I accompanied him to the camp. We got to the vicinity of Verdun, too."

Atlantic Air Craft Company's Battleplane

(*Continued from page* 68)

Power Plant

Two 92 H.P. Aeromarine motors are used. Two 8 ft. propellers are driven in the same direction. For the present, the motors are exposed, but it is intended to cover them with a streamline sheet-metal housing, as shown on the drawing. In case one of the motors is stopped for any reason, the other will continue to support the machine in flight, with the rudder set against the motor which is running.

Fuel tanks are located between the two cockpits, and one tank at the bottom or floor of the fuselage.

The motors have 6 cylinders each, with a bore of 4 5/16 in. and stroke of 5⅛ in. Lubrication is maintained irrespective of the angle at which the machine is flying. An oil reservoir is provided with a capacity of five gallons. Each motor is equipped with two three-branch intake pipes and two Zenith carburetors with synchronized throttles. Ignition is by two Bosch magnetos and two sets of spark plugs, one magneto being used for each set of plugs.

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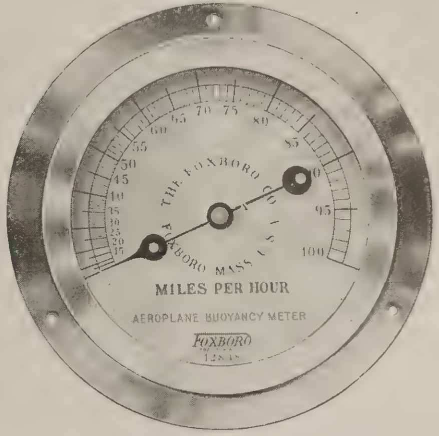

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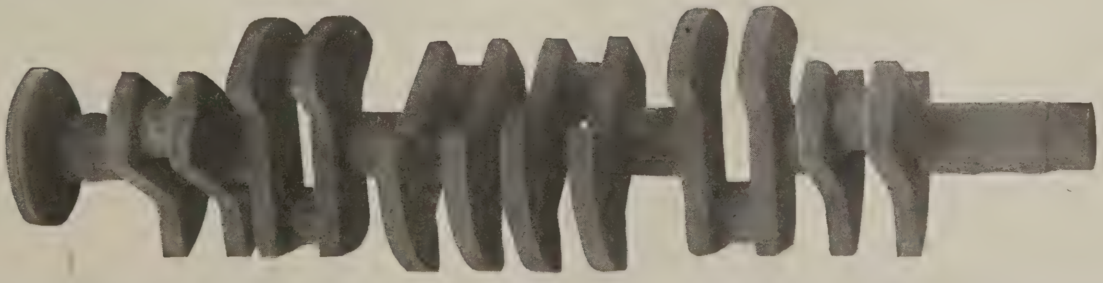

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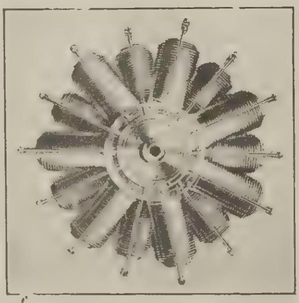

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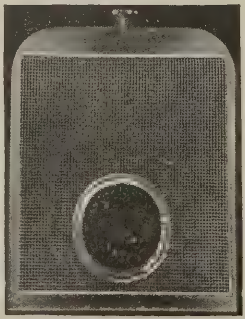

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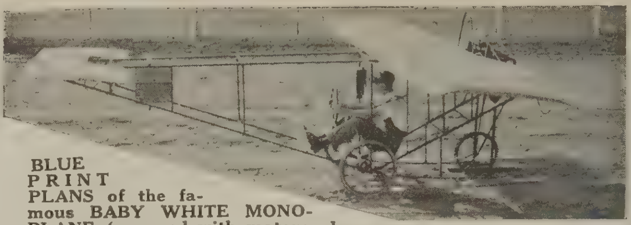

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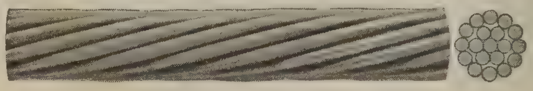
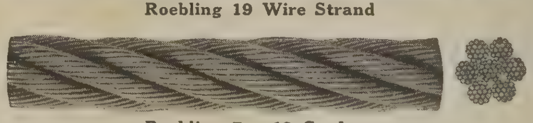


Roebling 19 Wire Strand



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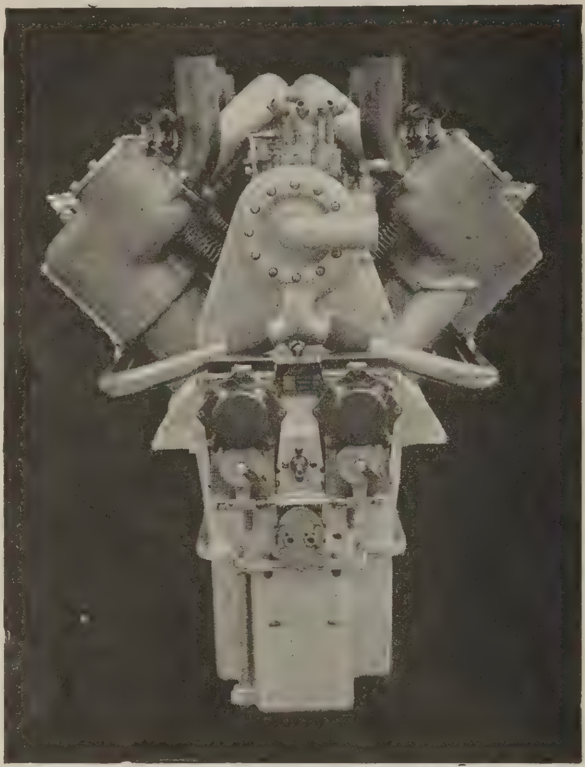

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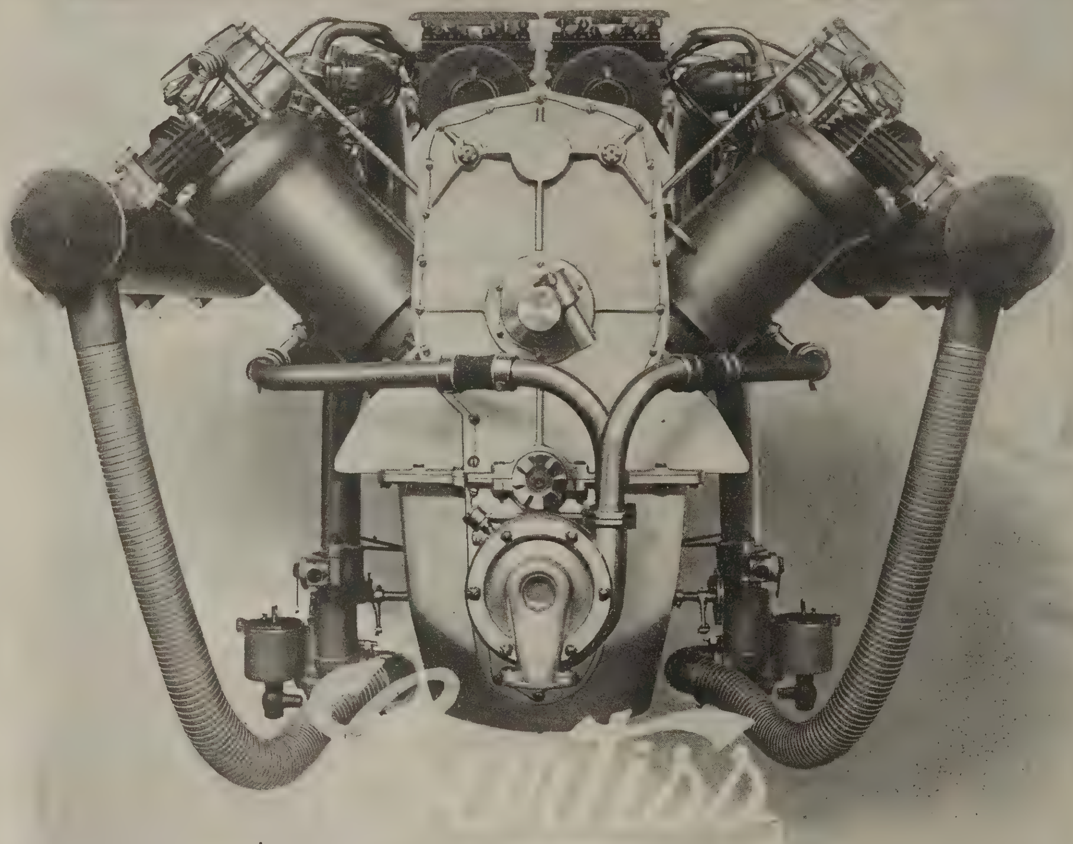

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WEEKLY

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The Deplorable Conditions Which Have Prevented Development of Our Aerial Defenses Made Public

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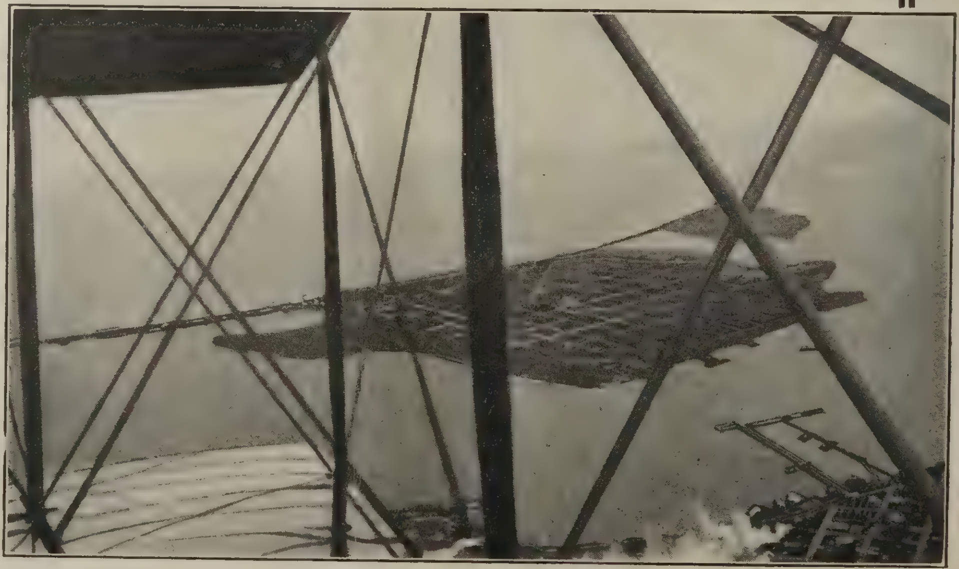

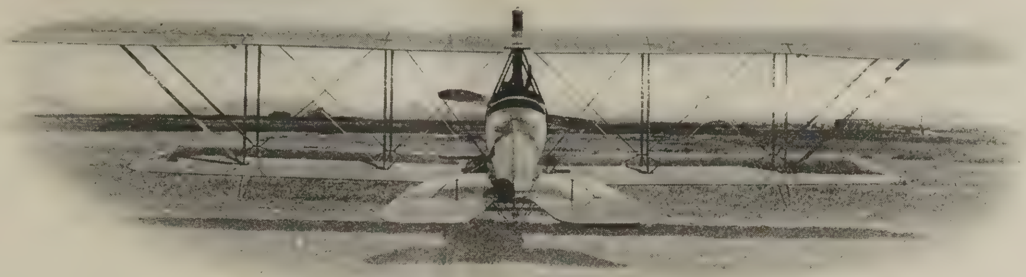

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Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

APPLICATIONS FOR SPACE SHOULD BE ADDRESSED TO

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CHAIRMAN, ORGANIZING COMMITTEE

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AERO CLUB OF AMERICA'S PRAISEWORTHY WORK TO INTEREST 200,000 COLLEGE STUDENTS IN AERONAUTICS

TO interest over 200,000 college students in aerial preparedness, and realizing that if progress in aeronautics continues to be as swift as it has been in the last three years, in five years from now aircraft will be used extensively for commercial purposes, and the aeronautic field will afford splendid opportunities for the young men who are now at universities fitting themselves for active life, the Aero Club of America has decided to offer three medals of merit to each of the fifty Universities and Colleges which have between 2,000 and 16,000 students each.

The Aero Club of America medals of merit are to be awarded in the coming year to the three students of each of the fifty Universities and Colleges who write the best essay on:

(1) Military aeronautics;

(2) Mechanics of the aeroplane and possible technical development in aeronautics.

(3) Possible application of aircraft for utilitarian purposes.

The fifty Universities and Colleges selected, having between 2,000 and 16,000 students each, are as follows:

Alabama Polytechnic Institute, Auburn, Aabama; Boston University, Boston, Mass.; Carnegie Institute of Technology, Pittsburgh, Pa.; College City of New York, New York City; Columbia University, New York City; Cornell University, Ithaca, New York; Dartmouth College, Hanover, N. H.; Drake University, Des Moines, Iowa; Fordham University, Fordham, New York City; Georgetown University, Washington, D. C.; George Washington University, Washington, D. C.; Harvard University, Cambridge, Mass.; Illinois State Normal University, Normal, Illinois; Indiana University, Bloomington, Indiana; Iowa St. C. A. & M. Arts, Ames, Iowa; Kansas State Agricultural College, Manhattan, Kansas; Leland Stanford University, Stanford University, California; Mass. Institute of Technology, Boston, Mass.; Mechanics' Institute, Rochester, New York; New York University, New York City; Oberlin College, Oberlin, Ohio; Ohio State University, Columbus, Ohio; Ohio University, Athens, Ohio; Oklahoma Agri. & Mech. College, Stillwater, Okla.; Pennsylvania State College, Pittsburgh, Pa.; Pratt Institute, Brooklyn, N. Y.; Princeton University, Princeton, New Jersey; Purdue University, Lafayette, Indiana; State University of Iowa, Iowa City, Iowa; Syracuse University, Syracuse, New York; Teachers' College, Manhattan Borough, N. Y.; Temple University, Philadelphia, Penn.; Tulane University, New Orleans, La.; University of California, Berkeley, California; University of Chicago, Chicago, Illinois; University of Illinois, Urbana, Illinois; University of Minnesota, Minneapolis, Minnesota; University of Kansas, Lawrence, Kansas; University of Missouri, Columbia, Mo.; University of Nebraska, Lincoln, Nebraska; University of Pennsylvania, Philadelphia, Penn.; University of Pittsburgh, Pittsburgh, Penn.; University of S. California, Los Angeles, California; University of Tennessee, Knoxville, Tenn.; University of Texas, Austin, Texas; University of Washington, Seattle, Wash.; University of Wisconsin, Madison, Wis.; Valparaiso University, Valparaiso, Indiana; West Virginia University, Morgantown, W. Virginia; Yale University, New Haven, Conn.

The total number of students at these Universities is over 200,000, the highest being Columbia University with over 16,000 students, and the University of Minnesota, University of California, University of Chicago, University of Wisconsin, University of Pennsylvania, Valparaiso University, New York University, Cornell University, Harvard University and University of Illinois with between 5,000 and 10,000 students respectively.

The offer may be extended to additional universities in the near future.

The good work of the twelve Yale men and twenty-one Harvard men, and not less than fifty members of other Universities who learned to fly in the past summer made the Executive Committee of the Aero Club of America conclude that great developments may be expected in aeronautics from a utilitarian, scientific, as well as national defense standpoint, through interesting the 200,000 university students.

THE DEPLORABLE CONDITIONS WHICH HAVE PREVENTED DEVELOPMENT OF OUR AERIAL DEFENSES MADE PUBLIC

MOST amazing conditions regarding the shortcomings of the Aviation Section of the Army are made public in the following open letter from Mr. Alan R. Hawley, president of the Aero Club of America, which is an answer to the official statements issued by Washington officials who claim that so far as aeronautics is concerned "the nation can view the future with confidence and serenity."

The evidence shows that the Aviation Section does not want an increase of Army aviators, does not want the National Guard to have training in aviation, has not carried out the plans to organize the Aerial Reserve Corps authorized last July by President Wilson; has only an aero squadron in service ready to meet an emergency; is only establishing three aviation training schools when ten are needed; has only half a dozen instructors when sixty are needed; is hurting the sources of supply needed for national defense instead of developing them; has a corps of inspectors who are ignorant of the first principles of aeronautics; has disgusted hundreds of volunteers and workers for national defense with its destructive actions and dissipated the resources developed in two years of work, and although the Army has $13,281,666 to spend in aeronautics, there are no immediate prospects of its getting a substantial air service.

Mr. Hawley's letter to Secretary Baker pointing out these deplorable conditions follows:

Hon. Newton D. Baker,
Secretary of War,
War Department,
Washington, D. C.

My Dear Secretary Baker:

The Aero Club of America has again been appealed to by a National Guard officer, who, having applied to the Aviation Section of the Army for training in aviation for the members of his company, and having been told that the Army had decided to limit to $76,000 the expenditure for training National Guardsmen, appeals to us for financial assistance, to pay for the training of his men.

This officer inquired from Major William Mitchell, assistant to Lieutenant Colonel George O. Squier, head of the Aviation Section, whether additional training could not be provided for, pointing out that Congress has allowed $9,640,800 for training National Guardsmen and organizing twelve Aero Squadrons for the twelve Militia Divisions of the United States, and Major Mitchell told him that while it is true that the plan to organize twelve aero squadrons for the twelve Militia Divisions was used as a basis for getting the appropriations, the Army Appropriation Bill does not specify what it shall be spent for, and the officers of the Aviation Section have decided to limit the National Guard as stated!

An Amazing State of Affairs Destroying Resources Developed in Past Two Years

This is only one of the evidences of a most amazing state of affairs existing, and is the climax of a period of incredible destructive attitude on the part of those in charge of upbuilding our aerial defenses, a period during which this antagonistic attitude has destroyed the work of two years, and has not only delayed the solving of the problem of getting the personnel for our air service, but is disgusting the thousands of National Guardsmen and civilians who volunteered to join the Air Service and the tens of thousands who have worked to develop our aerial resources for national defense.

We have had occasion to bring some of these conditions to your attention repeatedly in the past three months; it is now our duty to present the entire situation to you and to the public, so that the obstacles which are preventing the developing of our aerial defenses may be removed and steps taken to prevent the loss of valuable aeronautic resources which this country needs so badly.

Because the conditions are so incredible, and that you may see the situation exactly as it exists, we will trace the events that have led to the present situation in chronological order.

The Aero Club of America, the national organization which has been fostering the development of aeronautics in America since 1905, has always given its hearty co-operation and assistance to the Army in all things pertaining to aeronautics, beginning as soon as the Army began its experiments in aeronautics, and our relations have always been most cordial.

Ten years ago when there was evidence of a possibility that the Wright aeroplane patent might be an obstacle in the way of aviation, the Club made an effort to buy the patent and present it to the nation.

Secretary of War Garrison Started Aero Club Working on Getting National Guard and Civilian Aviators to Solve Problem of Personnel Shortage

In 1914, when the events that followed the declaration of the European war emphasized the necessity of building our defenses, and it was found that the Army had only a few aviators and aeroplanes, and no funds with which to develop that branch of the Army, the Aero Club of America realized that it was its duty to take steps to make known to the general public the value of aeroplanes and the necessity of upbuilding our aerial defenses. It began a campaign of education and concentrated its efforts on securing from Congress the necessary funds for the developing of the Army and Navy air services, until it found, when Congress made a small appropriation for aeronautics, in 1915, that the smallness of the appropriation was due principally to the apparent inability to get officers of the Army and Navy to join the air service.

At that time the Secretary of War, Mr. Lindley M. Garrison, replying to a letter in which it was pointed out that while other nations numbered their aviators and aeroplanes by the thousand, the air service in this country had been almost totally neglected, wrote to the Aero Club of America pointing out that the great problem was getting personnel. He said:

> *"The number of aeroplanes possessed by any government is no criterion of its strength in the air. Personnel, not material, is the vital factor in aeronautics. The acquirement of the former requires a considerable period of time, the latter merely an appropriation of money."*

The Aero Club of America then decided to devote its efforts on solving the problem of getting the personnel for the air service. It soon found that whereas every branch of the Army was short of officers and men, the personnel for the air service could not be gotten except by slighting the other branches of the service, and that the Army found it impossible to get recruits to bring up the Army to the strength authorized by Congress—which, as we know, is still a fact to-day. We realized, therefore, that to solve the problem of building our air service it was necessary to go outside of the Army to get the personnel. We realized that next to the Army, the National Guard, owing to its having military training and being subject to military discipline afforded the best prospects, and that the best solution to the problem of getting personnel was to encourage the developing of aviation in the National Guard, as well as among civilians, bringing these two elements under the direction of the Army, so that their training would as closely as possible conform to the federal standard in organization, equipment and discipline.

Aero Club of America Paid for Sending Aviators to National Guard Maneuvers

From that time on the Aero Club of America has concentrated its efforts on carrying out its purpose of solving the problem of getting the personnel for the air service. As we have kept the War Department advised of every step that has been taken in developing this movement, you have in your files complete details regarding what has been done by the Aero Club since then. You probably know that in 1915 we paid for sending aviators to participate in the maneuvers of the National Guard of different States, and subsequently secured private contributions for the training of National Guardsmen and starting aviation detachments in the National Guard and Naval Militia of different States. At the same time, we did everything that could possibly be done to foster the development of aeronautics, so as to develop our sources of supply of aeroplanes and trained aviators.

To create public interest, we instituted an educational campaign, during which we distributed not less than two million pieces of literature. As our only purpose was to develop our aerial defenses, and none of the officers of the Aero Club of America are interested in manufacturing or selling aeroplanes, and these officers patriotically did the work connected with this campaign without salaries or hope of reward, the country at large readily and willingly gave its support. Our records show that the Aero Club of America and its thirty affiliated clubs received the support of several hundred organizations, about three thousand publications, and thousands of individuals. Congressional leaders have been frank in stating that it was the public demand that forced them to allow close to $18,000,000 for the upbuilding of our aerial defenses, which represents an increase of $14,000,000 over the total appropriations which you and Secretary Daniels asked for aeronautics.

National Guard Eager to Take Up Aviation—Thousands of Recruits Might Have Joined the Service, but Aviation Section Failed to Encourage

We found the National Guard eager to take up aviation, and the heads of the National Guard anxious to develop this most effective branch of our defenses. A thorough investigation proved to our satisfaction that the reason the National Guard had not developed this branch of the service was that the Federal Government had failed to give the Guard the slightest assistance. Our efforts in trying to arouse interest resulted in close to 1,000 National Guardsmen volunteering for the air service, 100 of whom began their course of training, which was paid for by private contributions. We also found hundreds of civilians who would not otherwise join the National Guard, willing to join if given an opportunity to enter the air service, and we have reasons to believe that had the least encouragement been given by the War Department, and even if there had been imposed a condition that men would have to belong to the National Guard for at least one year before getting an opportunity to join the air service, at least ten thousand men would have joined the National Guard to get this opportunity.

These very substantial results made us realize that here, at last, was a solution to the problem of getting the personnel for the air service. We believed that among these thousands of patriotic men, who were anxious to join the air service, the Army would probably find a good many candidates who could conform with all the requirements and would make suitable candidates for the air service of the Regular Army.

The only thing needed, then, was some encouragement from the War Department. So we wrote to you under date of May 15, 1916, inquiring what the plans of the War Department were to train National Guardsmen and supply the National Guard with aeroplanes. Under date of May 22, you answered that the War Department had

> *"submitted estimates to Congress for the sum of* $76,000 *to be made available from the next appropriation for the purchase and maintenance of material and equipment necessary for the proper instruction in military aviation of such officers and enlisted men of the National Guard of the United States as may be authorized by the War Department to attend the United States Signal Corps Aviation School . . . Estimates have also been submitted for* $1,000,000 *to begin the*

> *equipment of such aero units of the National Guard of the United States as the War Department may authorize in the near future."*

We realized that $76,000 was not sufficient for training the National Guard, and that whereas the one million dollars was only to support the aero units of the National Guard which might be organized at private expense, and whereas it takes between $100,000 and $200,000 to purchase the equipment needed for the training, the field, hangars, maintenance, etc., for an aero company, the formation of aero companies would naturally be very slow.

Aviation Section Anxious to Train National Guard in Aviation During Mexican Crisis

Therefore, we urged that more liberal provision be made to assist the National Guard, and were successful in bringing the matter before Congress and making Congress realize the problem and the necessity of providing sufficient funds for training hundreds of National Guardsmen and organizing aero units in the National Guard of the different States. At about this time the Carrizal tragedy made it necessary to call volunteers and organize additonal aero squadrons for the protection of American lives and American property at the Mexican border, and Lieutenant Colonel George O. Squier, the officer in charge of the Aviation Section, accepted the Club's offer to secure suitable volunteers, and requested that the Club furnish his department with a list of all National Guardsmen that were being trained in aviation at private expense, and civilian aviators who were willing to volunteer their services.

The result was that the Army took control of the training of about one hundred National Guardsmen from twelve different States, at Mineola, Long Island.

At that time the Aviation Section of the Army seemed to be anxious to organize National Guard units, and we understood that it had the authority to control the training of National Guard aviators and the forming of aero units. During a visit of the Club's Committee to the officers of the Aviation Section of the Army, Major Mitchell, Colonel Squier's assistant, gave us a document, containing an interpretation of the sections of the National Defense Act of June 3, 1916, which, we understood, the officers of the Aviation Section had prepared for the General Staff of the Army, defining the authority of the Aviation Section of the Army regarding the control of all matters pertaining to aeronautics under the Defense Act. This document shows that the Aviation Section has full control over everything pertaining to aeronautics in the National Guard, reading, in part, as follows:

> *"Section 60 prescribes that organization of the National Guard shall be the same as those for the Regular Army, and that the President may prescribe the particular unit or units, as to branch or arm of service to be maintained in such State, territory or the District of Columbia. Therefore, under this provision, this office may make recommendations as to what aero units each State shall contain and these will be carried out through the Division of Militia Affairs."*

It seemed then that the only problem to be solved was to get a sufficient appropriation that would permit the training of National Guardsmen, so we set to work enthusiastically to secure the appropriations.

Aviation Section's Estimates Show That It Asked Congress for $9,640,800 for Training National Guard and Aerial Reserve Corps Authorizad by President Wilson

The Aviation Section of the Army not only approved this movement, but it submitted estimates to Congress for the appropriations necessary for the formation of the twelve Militia Aero Squadrons. In answer to our letter of June 10, 1916, addressed to you, Lieutenant Colonel George O. Squier answered on June 26th giving the estimates which had been prepared by his office, and these included the following:

> *"Establishing and maintaining for one year twelve Militia squadrons for the mobile army and for coast defense,* $7,200,000."

As the above did not include a provision for training civilians in aviation, and it seemed advisable to make such a provision, so that men with aeronautic experience who could not give the time required to perform continuous National Guard duties could be connected with the national defenses, the Aero Club, after ascertaining that the Aviation Section of the Army was in favor of creating such a reserve, recommended the creation to President Wilson, who authorized the organization of the Aerial Reserve Corps on July 13. While our Committee was in Washington on this mission, an officer of the Aviation Section of the Army gave us a copy of revised estimates that had been made since the letter of June 26th had been written, and these estimates included the following item:

> *"For the organization, equipment, and maintenance of twelve aero squadrons for the twelve Militia Divisions ordered into service, either in the Militia or from the Regular Army Reserve and the Officers' Reserve Corps,* $9,640,800."

It was understood that the increase from $7,200,000 to $9,640,800 was to take care of the training and organization of the Aerial Reserve Corps.

Congress appreciating the importance of providing funds for the National Guard and Aerial Reserve Corps; likewise the value of having all these developments under the control of the Aviation Section of the Army, allowed the $9,640,800 as part of the general appropriation for aeronautics, as the Aviation Section of the Army requested.

Provision in Army Appropriation Bill Pooling National Guard Appropriation with Smaller Army Appropriations Was Written by Aviation Section Officers

During one of our visits to the Aviation Section of the Army, there was explained to us the advisability of having appropriations to be granted for the National Guard combined with the appropriations for aeronautics for the Army, and we approved the procedure, believing best to leave expenditures to the discretion of the War Department. We have on file a carbon copy of the provision for aeronautics, written by the officers of the Aviation Section, for the Army Appropriation Bill. It reads as follows:

> *"PROVIDED, HOWEVER, That not more than* $13,981,666.00 *of the foregoing appropriation shall be used for the purchase, manufacture, maintenance, operation and repair of airships and other aerial machines and accessories necessary in the aviation section and for the purchase, maintenance, repair and operation of motor-propelled, passenger-carrying vehicles which may be necessary for the aviation section (of which amount* $100,000 *is made immediately available)."*

First Intimation of Antagonism Against National Guard

We got the first intimation that there was some antagonism to the National Guard at the time that our Committee went to Washington to thank President Wilson for authorizing the Aerial Reserve Corps and to urge the Congressional leaders to allow the appropriations needed for training National Guardsmen and organizing the Militia Aero Squadrons and the Aerial Reserve Corps. At that time there were about fifty-five National Guardsmen at Mineola, and most of them were kept in idleness through the failure of the Army to provide aeroplanes for their training; and hundreds of Guardsmen from practically every State in the Union, who had expressed their eagerness to take up aviation, kept writing, wiring and telephoning to the Aero Club of America for assistance, which, so far, the War Department had denied them. We were surprised on that occasion, when we mentioned the National Guard, to hear Major Mitchell, the Assistant to Colonel Squier, state that "The National Guard will never amount to anything."

Aero Club Recommended Increase of Army Aviation Also

In trying to figure out an explanation for this antagonistic attitude towards the National Guard, it was suggested that, possibly, Major Mitchell was expressing, in other words, his office's preference for an increase in the number of Regular Army aviators and the Committee promptly recommended to you the authorization of the additional four increments of the Signal Corps of the Army provided for in the National Defense Act, which the President can authorize at his discretion, and which would increase the number of Army aviators, and the number of executive officers in proportion, thereby providing the executive officers needed to supervise the training of the National Guard and the Aerial Reserve Corps. Your records will show that this recommendation was made under date of July 20th. You will find in this letter evidence of our anxiety regarding the delay in arranging for the training of the National Guard. Paragraphs 5 and 6 of this letter read as follows:

> *"The War Department has a four-fold responsibility in connection with this movement. The National Guard, the Aero Clubs, and other organizations and individuals, will now look to the Department to assist them in securing the co-operation and fatherly supervision which is needed to direct and encourage the development of vol-*

> *unteer aero organizations. The nation, particularly the press, having demanded larger appropriations for aeronautics from Congress, will stand in expectation of developments. Congress, which is increasing the appropriation so as to give the means with which to build our aerial defenses; and the President of the United States, who has taken personal interest in this development, will now very rightly expect to see the development of a substantial air service to justify their actions.*
>
> *"Prompt action is expected, with tangible results, which must be visible in increased number of aviation centers, aero squadrons, aviators and aeroplanes available. The country will not care how this is done, and whether mistakes are made, but it will expect tangible and prompt results—failing which, it will surely have just cause for criticism."*

We recall that you did not seem to be unfavorably impressed with this recommendation, and you referred us to Brigadier General George P. Scriven, the Chief Signal Officer, who was evidently in favor of the increase. But the fact that it was not put into effect is evidence that this increase in the number of Army aviators and executive officers was not favored. Why?

Major Mitchell's Derogatory Remarks Against National Guard Resented

We realized that since Major Mitchell was practically in charge of the details pertaining to such matters, Colonel Squier having just returned from a four years' duty as military attache in London and was not familiar with the current trend of events in Washington, this attitude of mind might interfere with the carrying out of the plans. But nothing was said about the matter until Major Mitchell, during a visit to the Mineola Aviation center, during a conversation regarding the National Guard's anxiety to develop in aviation, exclaimed, *"Hell with the National Guard! It will never amount to anything."*

I was one of three people present when Major Mitchell so expressed himself, and was incensed to hear such derogatory expressions from an Army officer, at a time when thousands of National Guardsmen were at the Mexican border protecting American lives and American property at a great sacrifice to themselves, their business and their families. I considered it my duty to protest to Major Mitchell and to bring the matter to the attention of Colonel Squier, which I did, first in a letter dated July 28th. Receiving no answer, I wrote again on August 14th. I received no answer to these letters until September 11th, when I received a brief acknowledgement.

One Hundred National Guardsmen Kept Idle Months for Lack of Training Aeroplanes and Order Is Issued Limiting Training to Fifty Guardsmen

We had already given close to $22,000 from the National Aeroplane Fund to the First Aero Company, New York National Guard, and had loaned $7,500 to the commanding officer, in addition, with which to purchase an additional aeroplane, to make up for the Aviation Section's failure to supply aeroplanes. We could go no further.

In the meantime, throughout these many weeks, the Aviation Section of the Army failed to supply the aeroplanes needed for training the hundred National Guardsmen at Mineola, and it was only when we offered to guarantee the payment for $50,000 worth of aeroplanes for the Guardsmen if the Army would order them that two aeroplanes were sent to Mineola. The need was for at least thirty aeroplanes.

Subsequently, when these conditions created general protests, and the First Aero Company, New York National Guard, asked to be mustered out and the Second Aero Company, New York National Guard, was being disbanded, two more machines were provided. A few more machines were sent after the publication of the deplorable conditions, following the mustering out and disbanding of the First and Second Aero Companies. No steps were taken to provide aviation training for the hundreds of National Guardsmen who were anxious to join the air service and finally, on September 8th, the Militia Bureau issued order No. 580.7 addressed to the Adjutants General of all States, stating that the present Congress had only appropriated the sum of $76,000, and that not exceeding fifty National Guardsmen could be trained in aviation.

We hoped that this was a mistake, but as no action was taken to rectify it, on September 13th I wrote to you, pointing out that it was vitally important that the limitation imposed on the number of National Guardsmen to be trained should be removed, and giving the facts surrounding the situation and stating that Congress had appropriated $9,640,800 for the National Guard. I have not yet received a reply to this letter, or to the telegram sent to you regarding this letter. From the statements of Major Mitchell to the National Guard officer who called at the Aviation Section of the Army a few days ago, it is evident that this limitation has not been removed, and that nothing has been done in this direction.

Plans to Train Aerial Reserve Corps Authorized by President Wilson Not Carried Out

Nor has anything been done to organize the Aerial Reserve Corps, which was authorized by President Wilson on July 13th, and which could have been put into effect immediately, the civilian schools having offered to allow the Army to operate their schools for the training of National Guardsmen and members of the Aerial Reserve Corps, and the manufacturers of aeroplanes having been throughout these months in a position to supply all the training aeroplanes needed for the training of even 500 men. Yet in the copy of a letter from the Chief Signal Officer to you, dated July 11th, which you enclosed with your letter of July 12th to me, it was stated:

> *"There are at least eight civilian training schools for aviators distributed throughout the country, and each of these have already offered their facilities to the Government under certain conditions, and a plan is being considered in this Department to receive candidates holding certificates from these schools, and to refund them the cost of their tuition. This plan was one of the means successfully adopted in England for receiving trained candidates in aviation."*

Congressional Record Proves that Congress Intended $9,640,800 Appropriation for National Guard

That Congress intended this appropriation of $9,640,800 for training and equipping the National Guard there can be no question. The Congressional leaders expressed themselves to this effect, and the Congressional Record shows that Congressmen who inquired were assured to that effect. The Congressional Record for August 9th, page 14,363, gives clear evidence on this point. Congressman Greene (of Vermont) was speaking:

> *"There was a Senate amendment to this Army Appropriation Bill making some specific appropriation for the establishment and maintenance of an Aviation Service in the National Guard. Will the Chairman of the Committee kindly say what is the result on that proposition under the Conference report?"*

Congressman Hay, Chairman of the Committee on Military Affairs, answered Congressman Greene as follows:

> *"Under this Bill* $13,000,000 *is appropriated for aviation purposes. I am informed by the War Department that* $10,000,000 *of that will be devoted to the development of aviation in the National Guard, and that they do not need any language other than that carried in the bill to enable them to devote that amount of money to that purpose."*

Could anything be clearer than that? Does it not appear from this evidence that, although it may not be conscious of it, the Aviation Section is disregarding Congress' wishes, and the best interests of the country in many ways in depriving the National Guard of the training it is entitled to, merely to satisfy the capricious notions of a prejudiced officer?

The War Department itself in the estimates which it issued to the press, and were published broadcast in newspapers on July 2d, stated that the sum of $9,640,800 was asked:

> *"For the organization, equipment and maintenance of 12 aero squadrons, for the 12 militia divisions ordered into service, either in the Militia or from the Regular Army Reserve and the Officers' Reserve Corps."*

Why, then, have there not been steps taken to train the hundreds of National Guardsmen who were eager to join the air service—and why were the hundred National Guardsmen kept idle at Mineola for months, until they could stay no longer?

Training Could Have Been Done with Deficiency Fund

This continuous delay cannot be attributed to the delay in the signing of the Army Appropriation Bill, because, as in the case of all expenditures made necessary by the Mexican crisis, such as the expenditure connected with the equipping of troops and enlisting and training of men in other branches of the Service, which amounted to over $50,000,000, the expenditures connected with training National Guardsmen in aviation could be met from the deficiency fund.

Besides, it is evident by the fact that nothing has been done to develop either the National Guard Aero units or the Aerial Reserve Corps since the Army Appropriation Bill was passed by Congress, that these delays have been due to other causes.

But, we submit that whatever the causes, it is hard to find justification for dissipating these valuable resources of personnel for our national defenses.

Surely conditions could not be worse, our need for an adequate air service could hardly be greater than it has been in the past six months. For American lives and American property were destroyed, and to afford some protection it required all our mobile troops and the best part of our Militia. Had we had to meet one of those sudden emergencies which nations are apt to have to meet in these days of international conflicts, we would have been helpless, as we are today.

I may point out that in your letter dated July 12th to me you enclosed a copy of a letter from the Chief Signal Officer to you in which it was stated that the Signal Corps was *"already canvassing the National Guard for officers and men who have had aviation experiences and will attach them individually for training to the San Diego Aviation School, and at Mineola, L. I."*

There is no mention in this, or in any other letter, of any lack of authority, or financial difficulties, to carry out the plan to train the National Guardsmen in aviation. Why was it not done?

The results show that the Aviation Section of the Army instead of utilizing these resources of men, instead of training the best of these hundreds of candidates—National Guardsmen and civilians—instead of guiding their patriotic impulses for the upbuilding of our defenses, has done the very opposite. Why?

Army Is Forced to Pay $5 for Recruits—Aviation Section Discourages Thousands of Volunteers

We submit that in view of the fact that the problem of Army recruiting is becoming harder daily, and that, as provided by the new National Defense Act, the War Department, as a last resort, is paying a reward of $5 for recruits secured by post masters, the loss of thousands of enthusiastic recruits for the air service, which is the most effective branch of the Service, is a serious loss.

Being entirely non-political we have hesitated long before bringing these deplorable conditions before the public, and we are doing so now only because we realize that we cannot any longer assume the responsibility of allowing the public to believe that the plans to meet the aerial defense issue praised in my letter of July 19th to President Wilson, are being carried out and that plans are being made to train one thousand aviators, as was stated by an officer of the Aviation Section for publication some weeks ago. Thinking that at last the Aviation Section had decided to carry out the plans to train National Guardsmen and organize the Aerial Reserve Corps, we promptly telegraphed our congratulations to both yourself and Colonel Squier.

The subsequent issuing of the order limiting to fifty the number of National Guardsmen to be trained in aviation, and an investigation brought out the fact that, unfortunately, there was no foundation for that statement. As a matter of fact, it would take about ten Army aviation schools for the advanced training and keeping in training five hundred Army, National Guard and Aerial Reserve Corps. To have more than fifty or sixty aviators at each school at one time would involve restriction in the amount of daily flying of each aviator, since having them all, or the largest part, in the air at one time, starting and descending would crowd the field to the danger point.

Only Three Aviation Schools, Ten Needed—Six Instructors, Sixty Needed—Only One Aero Squadron in Service

At present there are only two aviation schools in operation, at San Diego and Mineola, and one is being established at Chicago. Until there are ten, we will not have the proper facilities for giving military training to five hundred aviators. If the Army aviation schools are to teach the National Guardsmen—and it takes six months to train a military aviator—there will be required one instructor to every six men, until there are a sufficient number of efficient military aviators to instruct others. The Army schools have at present only half a dozen instructors. It will take twice as many instructors to train 600 students as there are Army aviators at present. The same shortage is true in mechanics. To instruct students without wasting time requires two aeroplanes for each instructor, one in commission and one in reserve. It would take two hundred machines to train six hundred students. The Army has less than forty training machines ordered.

There have been reports of three Army aero squadrons having been organized. This is only partially true. One aero squadron is organized, the others are under formation, but not only are they not equipped, but they have not yet completed their personnel.

Major Mitchell Publishes Destructive Statements About American Aeroplanes and Motors

Almost periodically there have been issued from the Aviation Section most unfair and destructive statements regarding American aeroplanes, American motors, and manufacturers, which have been printed widely. It is not true that American aeroplanes and American motors are not efficient and that American manufacturers cannot supply the Army as fast as it needs the aeroplanes. The evidence that the first is not true is that foreign countries who began purchasing aeroplanes in this country before the war are still doing so, and some of the types they are getting are superior to the machines of similar type manufactured in Europe. In fact, an order amounting to $6,000,0000 was placed by one of the European countries recently, at the very time when newspapers printed headlines based on statements issued for publication by Major Mitchell, alleging that American aeroplanes are "unfit for service" and American manufacturers cannot make deliveries. Evidently this foreign government knew better than this officer of our Aviation Section, who, being a newcomer in aviation, is not competent to judge.

Such careless statements are destructive, as they tend to restrict the development of the aeronautic industry, and thereby destroy our sources of supply for national defenses. There has been no excuse for such statements in the past year, American aeroplanes and motors having improved tremendously. The War Department can get reasonably fast deliveries by placing orders for steady deliveries extending over months. This it has not done, and the manufacturers have sustained losses in having to rush to fill small orders, then having to wait months for prospective orders, not daring to allow their trained workmen to go, and not having business to justify keeping them.

Such unbusiness-like actions are contrary to our new national policy, which is expressed in those sections of the National Defense Act which provide for the placing of orders with manufacturers purely for the sake of developing our sources of supply for national defense. The Army has needed training machines in large number, and many manufacturers could have been kept busy in the past six months turning out training machines. The trouble seems to be that the Aviation Section is inclined to want something different than what can be had and not want to give the constructors the time in which to develop it.

Foreign governments allow between six and nine months to their manufacturers to turn out something different than their standard products. Our Navy Department has been constructing an aeroplane of a type not so much different from the standard for the last eighteen months. American manufacturers do not even require as much time as foreign governments allow to turn out new types. They are better than foreign manufacturers in that respect—and that is why they get foreign orders.

Army Can Get American Aeroplanes and Motors Equal to Best European Products by Ordering Them

The membership of the Aero Club of America and its thirty affiliated aero clubs is composed largely of patrons of aeronautics, who are not only consumers, but also disinterested taxpayers, and could we detect the slightest attempt on the part of the manufacturers to hold up the Government, we would consider it our duty to combat such practice. But we know that manufacturers of aeroplanes and motors have been doing business with the Army and Navy at a loss, and with no encouragement whatever from the Government. The officers of the Aviation Section of the Army do not seem to realize that whatever builds up the American Aeronautic industry builds up the source of supply for national defense, and instead of fostering its development, have gone out of their way to prove publicly their unfounded notions that American aeroplanes and American motors are not efficient. Is this fair?

Our Army can get aeroplanes and motors equal to the best European products by placing orders for same for future deliveries, so that manufacturers can get the materials and trained personnel to fill them. It can get prompt deliveries on existing types by placing orders for such types without changes. It can assist the aeronautic industry greatly, and build up our sources of supply for national defense by adopting the broad and constructive policy recently adopted by the Army in purchasing motor trucks.

The Aviation Section's attitude towards the manufacturers has, so far, been the same as towards the National Guard. It stated that the Guard will "never amount to anything" and prevented it from proving the contrary by withholding the training and equipment needed; it stated that the manufacturers were unable to deliver, and prevented them from proving the contrary by not placing sufficiently large orders to enable the manufacturers to improve their facilities, or the deliveries were delayed by a succession of changes which the officers of the Section would order made while the order was being filled.

Army's New Corps of Aviation Inspectors Composed of Men Ignorant of First Principles of Aeronautics

Much has been said about the organizing of corps of aviation inspectors to be placed in each factory during manufacture to assist in procuring types of machines suited for military service. The entire corps of inspectors consists, from the chief down, of men taken from the automobile business—excellent men in that line, but totally ignorant of the first principles of aeronautics. Lack of knowledge of aeronautics is a serious handicap to an inspector. The science of aeronautics is much more exact and complex than the automobile science and deals with a third dimension of which an automobile man knows nothing. Again, an automobile man used to tremendous production in the automobile business, is apt to look down upon a manufacturer capable of turning out only from two to six aeroplanes a month. No one doubts, of course, that when trained in aeronautics, these inspectors may be very efficient, but in the meantime they are just learning the rudiments of aeronautics, and it would be wrong to allow the impression that they can assist in producing military aeroplanes or to assume that they are competent to criticise the work of aeroplane engineers and manufacturers.

I personally speak advisedly on this subject, having been one of the first users of automobiles, as well as one of the first users of aircraft. I know that a man is no more qualified to become an inspector of aircraft because he has been in an automobile factory than a man was qualified to become an inspector of automobiles in the early automobile days, just because he had been connected with a railroad.

Country is Tired of Vague Rumors and Promises, Demands Evidence of Action

The country is tired of vague rumors and promises—it now demands evidence of action. We are asked many times daily what there is being done to train one thousand aviators. Half a dozen countries have each between 2,000 and 6,000 aviators, and the increasing efficiency of aircraft and expansion of aerial operations make the country realize the danger of aerial unpreparedness.

What can we answer to the many people who inquire daily whether steps have been taken to begin training the one thousand aviators?

Attitude Towards National Guard Same as Former Attitude Towards Civilian Aviators Who Are Now in Franco-American Flying Corps

The Aviation Section's present attitude towards National Guard aviators is exactly like the attitude towards civilian aviators in 1913-1914. Several of those red-blooded American aviators who are now in the Franco-American Flying Corps, were anxious to join the United States Air Service then and were told that civilian aviators would never amount to anything. They have proven that the Army men were wrong, and we have already had occasion to regret that attitude. Had the Aviation Section adopted a constructive policy then, there could have been organized reserve aero squadrons composed of civilian aviators, and the Mexicans would undoubtedly have had more respect for American lives and American property.

Under the new National Defense Act, the National Guard, being Federalized, can be as efficient as the Army cares to make it.

Aero Club Supplied 100 Volunteers Over Night

For over two years, we have acted as volunteer recruiting agents for the War Department, contributing our time, efforts and funds to create sources of supply of aviators and aeroplanes for national defense. When the last Mexican crisis brought out the fact that the Aviation Section was utterly out of touch with the National Guard and civilian aviators, we were able to supply the names of a hundred volunteers over night. We have done this willingly and gladly, and the results show that we have done it successfully. We are still working and are willing to continue to work just as enthusiastically in the future. But we cannot stand by and see the resources developed at such great efforts, cost and time dissipated as they have been in the past.

Reaction of Aviation Section Neglect Makes Patriotic Volunteers Lose Faith in Army

There must be realized that there is great responsibility in asking patriotic young men to hold up their right hands and take the oath that binds them for six years in the National Guard or four years in the Aerial Reserve Corps, where they become subject to being called away from their business and families at any time—only, maybe, to be kept in forced idleness for months, as the members of the National Guard who have been at Mineola all summer, were.

There is an even greater responsibility to the nation in the reaction that follows when the enthused, patriotic young men, who volunteer their services to build our defenses, through the neglect of the authorities, not only lose their enthusiasm but also lose faith in the Army. We realize the necessity of preventing this last at all cost, and we have decided to prevent the hundreds of volunteers who have volunteered their efforts for building our aerial defenses from losing faith in the Army, even if we must again assume the responsibility of training men at private expense.

But our willingness to do all these things does not solve the problem. The patriotic young men anxious to volunteer their services, and the parents of young men, who, realizing the country's need, would be willing to sacrifice the great opportunities afforded by business or professional careers, to contribute to the upbuilding of our defenses, are entitled to the Government's consideration. For instance, we have just begun a campaign of education to interest hundreds of thousands of college men in aeronautics, realizing that if the progress in aeronautics continues to be as swift as it has been in the past three years, in five years from now aircraft will be used for commercial purposes and the aeronautic field will afford splendid opportunities for the young men who are now at universities and colleges fitting themselves for active life.

Cream of 19,000,000 Men of Military Age Becoming Interested in Aeronautics

The splendid work of the twelve Yale men, twenty-one Harvard men, and about fifty members of other universities, who learned to fly in the past summer, to fit themselves so as to be ready to give their best efforts in case of a national emergency, lead us to believe that there will be more competitors for the medals of merit offered for the best essay on "military aeronautics" than for the best essays on "the possible application of aircraft for utilitarian purposes" or "the mechanics of an aeroplane and possible technical developments in aeronautics."

These young men may be said to represent the very cream of the nineteen million men of military age that we have in this country. We have been in touch with this class of men and we find them to be red-blooded Americans, all interested in national welfare and anxious to contribute their efforts to make this country secure from attack or humiliation. Before long these young men will have to decide what career they will follow. Many may wish to join our Air Service and they or their parents will ask for advice—and giving them advice means assuming responsibility for making their future life a success or failure. What shall we answer them?

Of course, we consider it our duty to answer them optimistically. But can we afford to tell them that their country needs them and then have them become disgusted through receiving the same treatment that the National Guard and volunteers received in the past summer?

Aero Club's Letter of July 19th to President Wilson Praising Substantial Provisions Made to Meet Aerial Defense Issue

We speak thus frankly because we consider it our duty to the country to do so. As you know, we were just as frank in our praises when we wrote to President Wilson on July 19th, expressing our appreciation for the provisions made to get and train aviators and build our aerial defenses. I will quote this letter in full, that you may see just how appreciative we were at the time of the attention given to this important issue by President Wilson, the Congressional leaders and yourself. The letter follows:

> *July* 19, 1916.
>
> *Hon. Woodrow Wilson,*
> *President of the United States,*
> *White House,*
> *Washington, D. C.*
>
> *My dear Mr. President:*
>
> *The Exctuive Committee of the Aero Club of America begs to express its appreciation of the personal consideration given to the matter of developing the aeronautical branch of our land defenses by yourself, Senator George E. Chamberlain, and the other members of the Senate Committee on Military Affairs; Congressman James Hay, and the other members of the House Committee on Military Affairs; and Mr. Newton D. Baker, your Secretary of War.*
>
> *Your action in authorizing the formation of the Aerial Reserve Corps, which permits, in a very thorough and efficient way, the enlisting of civilian aviators—business men, sportsmen, and others who pilot aeroplanes—to become part of the national defenses, under the supervision of the Army, with the opportunity of keeping up their*

(*Continued on page* 105)

THE NEWS OF THE WEEK

New Curtiss Triplane Rises 10,000 Feet in Ten Minutes

A Zeppelin destroyer was tested on October 1st at the Curtiss Aeroplane Company's flying grounds in Buffalo, N. Y. Victor Carlstrom, the long-distance record holder, was the pilot and tested the aeroplane under all conditions, remaining in the air for more than an hour and landing with ease.

The aeroplane is a tractor triplane and was developed in answer to the demand for an aeroplane which could leave the ground, overtake and destroy a raiding Zeppelin. The new machine made a maximum speed of 120 miles an hour and throttled down until it made 45 miles an hour. This is probably the greatest difference between the high and low speeds of any machine now in use. Both the British Sopwith and the French Nieuport pursuit machines make about the same high speed but cannot be throttled down to much less than 65 to 70 miles an hour, thus making it difficult to land without breakage.

The chief feature of the new triplane model is its ability to climb. On Sunday it ascended 10,000 feet in ten minutes, or at the rate of 1,000 feet a minute. It left the ground after a very short run and climbed at an angle nearer the vertical than any of the other fast machines yet developed.

Bonus for Harvard Aero Squadron

A check for $500, representing a bonus of $50 for each of the first ten Harvard men to take their aviation pilot's certificate, has been mailed by the Aero Club of America to Mr. Roger Amory, of Boston, chairman of the Undergraduate Aero Training Fund.

The ten Harvard men who qualified for the pilot's certificate are: Harry H. Metcalf, Hamilton Coolidge, Francis Inman Amory, Jr.; Robert Hilston Stiles, Edmund Elkins Bates, Mahlon Philip Bryan, Joseph R. Torrey, 2d; Frederick Stephens Allen, William Bartlett Bacon, Donald Dunbar Harries. They were trained at the Curtiss Aviation School at Buffalo, where they established the Harvard Aviation Camp on July 8.

Two other Harvard men, Earl Henry Bean and George C. Whiting, have taken their tests and gotten their F. A. I. certificate at the Wright Aviation School at Mineola, L. I.

All the certificates thus far received show exceptional flying ability, the result of thorough training and most of them have attained an altitude of between 2,000 and 3,000 feet, and have passed their tests on the Curtiss Tractor Military Type JN4. These men have been hardly two months' training, living in their own camp under practical military conditions and are now ready to take the advanced military aviation training.

Packard Aviation Field Nearly Ready

The aviation field planned by the Packard interests of Detroit is assuming definite shape. Hundreds of acres have been acquired between this city and Lake St. Clair, and workmen have been kept busy during the summer removing buildings, trees and fences. The whole field will be plowed and leveled off and laid out with cement roads, one of which will extend to the limits of the city.

Floyd Smith Flies from San Diego to Los Angeles

Flying at the rate of 85 miles an hour, Floyd Smith, chief pilot of the Wright-Martin Aircraft Corporation, accompanied by Instructor Burns of the same concern, made a successful air trip from San Diego to Los Angeles, September 20.

They used a Martin 125-horsepower reconnaissance machine of the latest type and flew at an altitude of 6,000 feet. Their course lay over the ocean's edge, dodging at Oceanside a heavy bank of fog. They left San Diego at 1:20 p. m., and arrived at the Inglewood aviation field at 3:07.

The machine is one of the type the company is making for the United States Government.

Two Sturtevant steel 125-horsepower battleplanes, first of the machines contracted for by the War Department for the north island military aerodrome, have been shipped from Boston to San Diego.

The aeroplanes are the most powerful yet sent and will be used by officers making flights to Los Angeles in the tests for the rank of junior military aviator.

Steps Taken to Add Seaplanes to Coast Guard

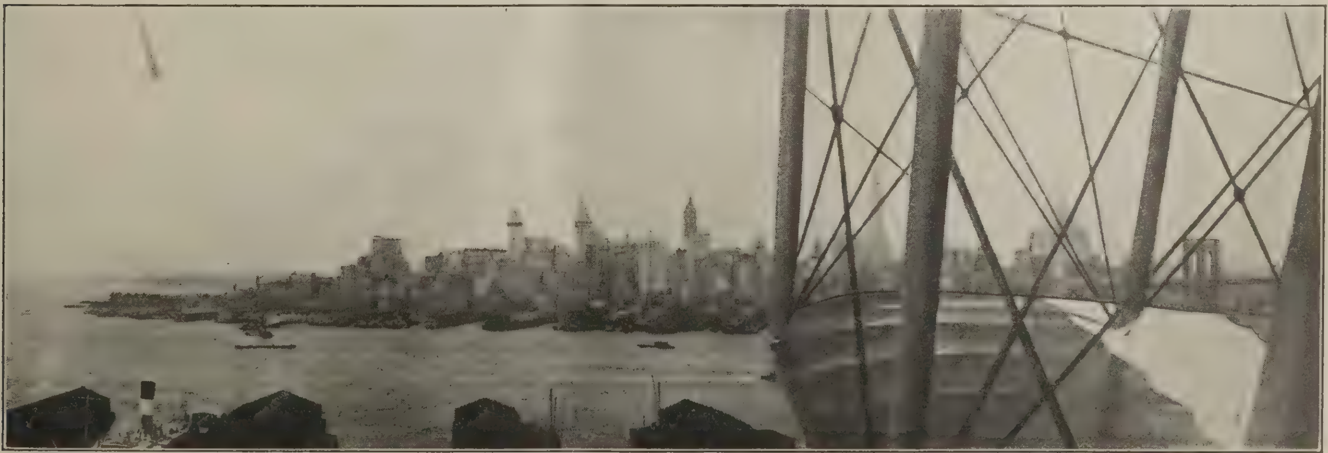
Active steps are being taken by the Coast Guard, under the authority granted by Congress in the last Naval Appropriation bill, looking to the establishing of aviation stations along the Atlantic seaboard. The type of air machine, it is said, has not been definitely settled upon, but it is expected that a form of seaplane will be adopted.

Officers of the Coast Guard are now being detailed to aviation inspection duty and as soon as sufficiently skilled, will be assigned to take charge of the several aviation units. For the present it is intended to establish about fifteen aviation stations under the control of the Coast Guard.

The specific duty of the aviators assigned to the Coast Guard stations will be to give information as to the condition and location of vessels in distress. Officers of the Coast Guard are confident that seaplanes will be able to render valuable aid to the seagoing cutters in the initial stages of salvage operations, and especially so in quickly determining the position of distressed craft. In this respect the plan is to cause the seaplanes to co-operate at all times with the cutters.

In time of war the Coast Guard aviation stations will pass under the control of the Secretary of the Navy, but in time of peace jurisdiction will be under the Secretary of the Treasury. Under the Navy Department the aviation stations will be utilized as additional eyes of the coast defence system.

A subdivision of the Coast Guard at Washington will have direct charge of the aviation branch, under the general control of the captain commandant of that service.



New York's skyscraper skyline, as seen from Lawrence B. Sperry's flying boat on his recent trip around New York.

Miss D. E. Ball, Assistant Secretary of the Aero Club of America, starting for a flight at the Atlantic Coast Aeronautic Station, Newport News, Va.

Ackerman Wheel Co. Organized

The Ackerman Wheel Company, incorporated under the laws of the State of Delaware for $2,500,000, has taken over the property and business of the Ideal Wheel Company, which has a factory at Massillon, Ohio.

A. H. Ackerman, of Chicago; Fred J. Griffith, and Mr. Everhard, of Massillon; L. J. Dolle, of Cincinnati, and H. P. Arndt, of Cleveland, are directors. Two others are to be named. Mr. Ackerman is president and general manager of the new company: Mr. Everhard, vice-president; Mr. Arndt, treasurer, and D. D. Walker, of Cleveland, secretary.

The consulting board of engineers consists of E. C. Arndt, of the Western Spring and Axle Company, of Detroit; P. R. Abbott, of the Peerless Motor Car Company, of Cleveland; R. W. Makutchan, of the Makutchan Roller Bearing Company, of Chicago, and Prof. John F. Keller, of Purdue University, Lafayette, Ind.

Of the total issue of $2,500,000 the sum of $1,500,000 will be issued, Mr. Everhard said. Massillon and Cleveland are being considered as locations for the new plant.

Hotel Efficiency

Just to show that there is something new under the sun, Mr. John McE. Bowman, president of the Biltmore and Manhattan hotels and who will be president of the new Commodore Hotel, which is to be erected at Forty-second street and Lexington avenue, New York City, has decided that inasmuch as the aeroplane has made wonderful progress within the last few years it will be no more than proper that space atop the new hotel be set aside for the aviators. When the hotel is completed any aviator will be welcomed for breakfast, luncheon or dinner and will find an aviation station for his use.

Army and Navy Orders

First Lieut. Norman W. Peck, infantry, to Fort Sam Houston for examination for detail in aviation section, Signal Corps.

Capt. Alvin C. Voris, Twenty-second Infantry, detailed in aviation section, Signal Corps.

First Lieut. Thurman H. Bane, Sixth Cavalry, to Fort Sam Houston for examination for detail in aviation section of Signal Corps.

Com. Officer Signal Corps Aviation School, Mineola, L. I., designated as acting aviation officer, East Dept.

First Lieut. Ralph S. Kimball, Infantry, relieved as an aviation student with the aviation section, Signal Corps, and on expiration one month's leave of absence will join regiment to which he may be assigned.

First Lieut. Guy L. Gearhart, Coast Artillery, attached aviation section, Signal Corps, as an aviation student, to Signal Corps Aviation School, San Diego.

First Lieutenant Arnold N. Krondstadt, inf., and Second Lieutenants Thorne Deuel, Jr., cav., and Whitten J. East, 16th Inf., attached aviation section Signal Corps as aviation students, to Signal Corps Aviation School, San Diego.

The following promotions of officers of the Signal Corps are announced: To be colonel: Lieutenant Colonel Samuel Reber, to rank from July 1, 1916. To be lieutenant colonels: Majors Edgar Russel and Charles McK. Saltzman, to rank from July 1, 1916. To be majors: Captains Basil O. Lenoir, William Mitchell and Charles S. Wallace, to rank from July 1, 1916, and George S. Gibbs, to rank from July 27, 1916.

Captain Hanson B. Black, S.C., from detail in that corps, September 15, 1916. Captain Black is detailed to enter the next class at the Army Staff College, and will proceed to Fort Leavenworth and report in person on October 16, 1916. (September 15, War D.)

Major Walter L. Clarke, S.C., from Fort Sam Houston, Texas, to Columbus, N. M., for temporary duty as signal officer, Punitive Expedition. (August 23, S. D.)

Captain David H. Bower, S.C., retained in the Signal Corps from July 1, 1916, as captain, is relieved from further detail in the Signal Corps, effective September 17, 1916. (September 16, War D.)

First Lieutenant George H. Brett, aviation officer, S.C., from further observation and treatment at the Walter Reed General Hospital, D.C., and will report to the chief signal officer of the Army for temporary duty in his office. (September 16, War D.)

Personal Pars

Blaine Elkins, son of the United States Senator Stephen B. Elkins, of West Virginia, has taken up aviation in earnest, and plans the construction of an entirely new model machine of original design. He has been quietly taking lessons from Aviator E. Kenneth Jaquith, of Chicago.

Lieut. Harold Geiger, Sixty-second Company, Coast Artillery, U. S. A., formerly in the aviation arm of the service, lectured before the Military Training Camp at Fort Lawton, Washington, last week on "Aeronautical Scouting and Warfare."

De Lloyd Thompson made three exhibition flights daily at the Montana State Fair at Helena, September 25 to 30.

W. G. Roberts, of Shawnee, Okla., fell to his death on September 19, when his motor failed him at a height of 1,200 feet.

Interior views of the Thomas Brothers Aeroplane Company factory at Ithaca, New York.

Wright-Martin Plans

The merger committee attending to the details of the consolidation of the Wright Aeroplane Co. The Glenn L. Martin Aeroplane Co. and the Simplex Automobile Co. announces that it has been determined to declare operative the plan and agreement under which Wright Aeroplane stock was deposited and that the committee has had organized the Wright-Martin Aircraft Corporation with $5,000,000 preferred, par value $100 and 500,000 shares of common stock without par value.

Old stockholders of the Wright Aeroplane Co. have the privilege of subscribing pro rata to the preferred stock of the new Aircraft Corporation. Each depositor of Wright Aeroplane stock who becomes a subscriber to the preferred stock of the new corporation will be entitled, in addition to the preferred stock, to two shares of the common stock.

The time fixed for the subscribers to take up and pay for the preferred stock expires Oct. 3. There will be issued a transferable receipt in respect to the preferred stock and a non-transferable receipt in respect to the common stock. On notice both the preferred and common stock may be withdrawn from sale. The syndicate is expected shortly to make a public offering of the new stocks.

Chicago-New York Flight Contemplated

From Chicago to New York between sunrise and sunset! Victor Carlstrom, already the holder of many records for long-distance aeroplane flights, has started preparations for a sunrise-to-sunset non-stop flight from Chicago to New York for *The New York Times.* Carlstrom will make his trip some day during the week October 9-16. He will fly alone and will carry with him a limited amount of mail which will be posted in Chicago in the morning and delivered to the addresses in New York on the evening of the same day if all goes well. This follows upon the action of the Post Office Department today in availing itself of the opportunity presented by *The Times* to use the flight as an experimental aeroplane mail route from Chicago to New York.

If Carlstrom succeeds in his attempt he will have established the record for long distance non-stop flight in the United States, and a world's record for long distance flight without a stop across country, for the trip between the two cities by the route which he has chosen will be something more than 900 miles.

Carlstrom will use a Model R Curtiss military tractor, equipped with auxiliary fuel tanks.

Sturtevant Navy Machine Tested

One of the aeroplanes designed for the United States Navy by the Sturtevant Aeroplane Company was flown September 18 from the old Atlantic Aviation Field, Boston.

The machine rose 2,600 feet in six minutes in one test, it was stated by company officials, and attained a speed of about 75 miles. Later a flight was made to Cohasset and back with F. S. Chanonhouse as passenger. In this the entire load—machine, pilot and passenger—weighed about 2,500 pounds. The pilot in both tests was R. M. Wright.

It is a convertible machine, designed for use either with pontoons on the water or with wheels on land. The trials were with the pontoons. A 140-horsepower Sturtevant motor supplies the power.

The fuselage is V-shaped and steel plated. It has a 45-foot wing spread and the struts are of wood. The Deperdussin control is used.

R. M. Wright, who piloted the machine, is a skilful aviator, and learned to fly at the Wright Brothers' School in Dayton, Ohio.

The machine tested is one of six school machines ordered by the Navy Department from the Sturtevant Company last January.

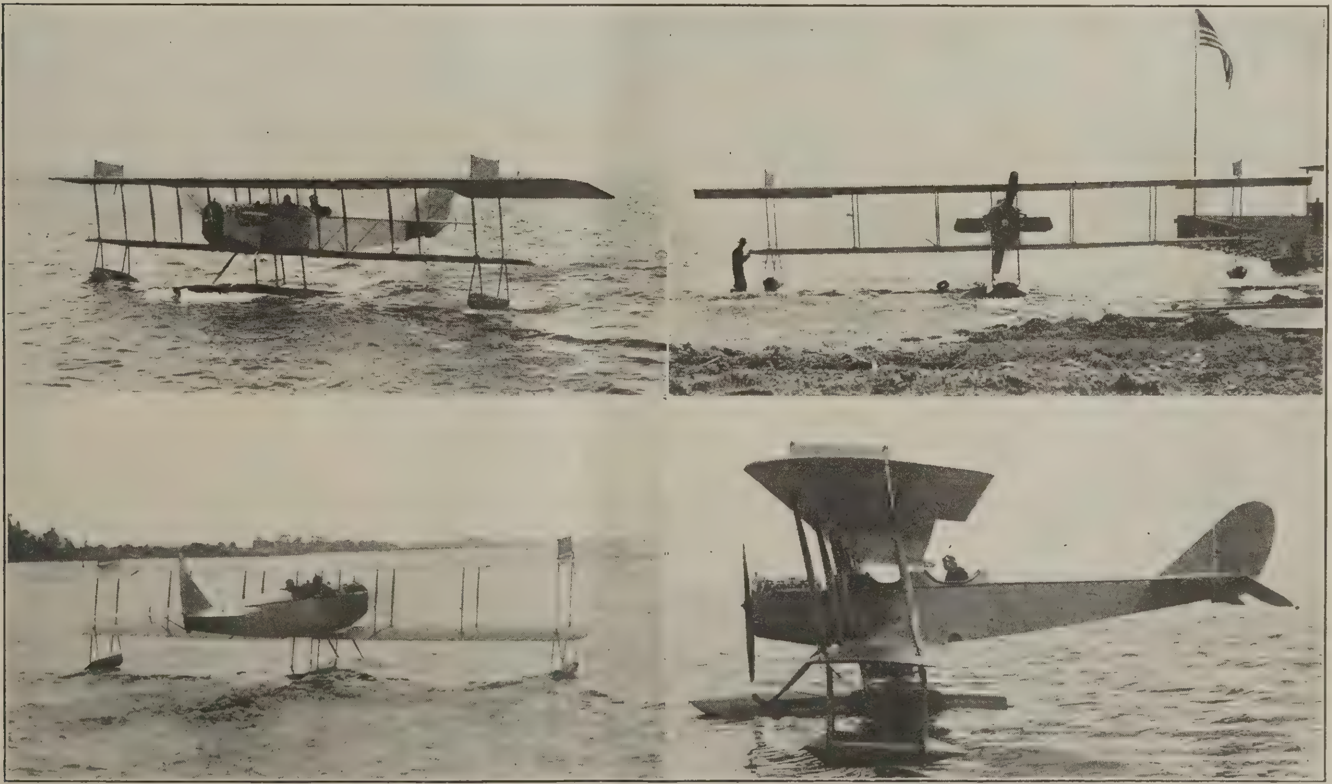
Inventor of S. K. F. Ball Bearings Declares Holiday for His American Employees

On Saturday, September 23, 1916, Mr. Sven Winquist, of Gothenburg, Sweden, inventor of the S. K. F. ball bearing, visited the new American factory of the S. K. F. Ball Bearing Company, at Hartford, Conn.

Mr. Winquist is president of the Swedish company, and a trustee of the Connecticut company. After inspecting the factory, Mr. Winquist expressed himself as very much pleased with the splendid start made. The American factory is already producing more bearings than its rated capacity, and Mr. Winquist stated that large additions to the present buildings would soon be necessary.

Mr. Winquist was very much gratified to see that the product of the American factory is of the same high quality for which S. K. F. ball bearings have always been justly famous. The raw material for the bearings—Swedish crucible steel—is imported, and the same manufacturing methods are used at Hartford as in Sweden.

As soon as Mr. Winquist and his party had finished their inspection of the factory, Mr. Winquist posted a notice stating that in appreciation of the excellent work done by the Hartford factory during the past few months, Saturday, September 30, would be a holiday with full pay.



The new model Curtiss single motored seaplane being tested out at Newport News, Va. This machine is equipped with a V X 160 H. P. motor.

Noteworthy Changes in Curtiss VX Motors

THE Curtiss VX motor of 160 h. p. rating has recently had incorporated a number of interesting changes which materially increase its power and durability and cause the above rating to become somewhat misleading when the motor's actual power development is considered. It can be said that no VX motor passes the factory's tests unless better than 190 horsepower are shown, and that practically all are now developing at least 20 horsepower at their final tests. In view of the already splendid performances of this engine, especially and more recently its work on the Mexican border, where most severe conditions are encountered, this added reliability and power is noteworthy.

To still further reduce vibration when running at top speed, the firing order has been changed, reducing the alternating stresses in the shaft 50 per cent, and thus greatly increasing the life of the shaft.

A new design gas intake manifold and water-jacketed carbureter connection-pipe is used to gain better distribution of the vapor and a fuller cylinder charge which results in a smoother torque and consequent added power.

The splines on shaft for propeller keying are changed for better fitting of hub in withstanding the lateral strains of the propeller and a gain in greater diameter of shaft between propeller and thrust bearing is obtained. Also an increase in size of the hub allows a gripping of more propeller wood between the hub flanges.

In the valve action, to prevent possible rocking under the valve seats, the exhaust valve springs fulcrum in a different manner, and the valves and seats have been relieved to prevent shoulders from forming after much operation. To reduce the tendency of push rods to occasionally whip laterally at high speeds the rods diameter has been enlarged.

The auxiliary air valve now has the air inlet between the choke tube, and the throttle valve in carbureter, which makes the adjustment constant and permits a very low throttling down without disturbance of the gas mixture.

The above changes are the outcome of a great many recent tests, both on the dynamometer stands and in actual flying at the Buffalo aerodrome, and from results given the engineers and pilots are viewing the new showing with a great deal of satisfaction.

Condor Aero Company to Erect Plant

The Condor Aero Company, of Buffalo, will erect a plant on the Walck Road, in North Tonawanda, and will start the construction of flying machines within the next thirty days. The company was only recently incorporated with a capital stock of $5,000,000. The factory site consists of twenty-eight acres.

All of the persons identified with the company are Buffalonians. They are William J. Hines, president; Max Near, first vice-president; Valentine Beuttner, second vice-president; George A. Cotton, secretary; William J. Wright, treasurer; A. R. Grant, Douglas Beckwith, E. L. Moses and Horace D. Hunt.

Recent Pilot's Certificates Granted

The following pilot certificates were granted at a meeting of the Governors of the Aero Club of America on September 27, 1916:

No. 589. Lawrence Leon, pupil at the Curtiss Aerodrome, Buffalo, N. Y. Machine used in tests, Curtiss Tractor JN4; Curtiss OX2 90-h.p. motor.

No. 590. Russell H. Moore, pupil at the Curtiss Aerodrome, Buffalo, N. Y. Machine used in tests: Curtiss Tractor JN4; motor, Curtiss OX2 90-h.p.

No. 591. Lt. Martin F. Scanlon, U. S. A., of the Signal Corps Aviation School, San Diego, Cal. Machine used in tests: Martin TT; Renault 70-h.p. motor.

No. 592. Lt. John D. von Holtzendorff, Signal Corps Aviation School, San Diego, Cal. Machine used in tests: Martin TT; Renault 70-h.p. motor.

No. 593. Edwin M. Post, pupil at the Curtiss Aerodrome, Buffalo, N. Y. Machine used in tests: Curtiss Tractor JN4; Motor, Curtiss OX2 90-h.p.

HYDRO.

No. 52. Samuel B. Eckert, pupil at the Philadelphia School of Aviation, Essington, Pa. Machine used in tests: Curtiss Model E Hydroplane; motor, Curtiss 100-h.p.

No. 594. Paul L. Ferron, Second Lieut., C. A. C., of the Signal Corps Aviation School, San Diego, Cal. Machine used in tests: Martin TT; Renault 70-h.p. motor.

EXPERT.

No. 57. Lieut. A. Blair Thaw; tests made in machine T78, at the Signal Corps Aviation Station, Mineola, L. I., New York.

To Hunt Ducks in Airship

Many hunters will be on Long Island for the opening of the duck hunting season. The favored hunting places are along the Great South Bay.

Army aviators who practice flights at Minneola and Hempstead, L. I., are planning to go duck shooting in their aeroplanes.

"There could be no better practice for marksmanship," said one of the army fliers, "than to hunt fast-flying birds like wild ducks in aeroplanes. The problem of maneuvring would get about the same as would be encountered in combat with a hostile flier, and hitting flying ducks from an aeroplane going ninety miles an hour would require a steady eye and hand."

Well-Known Company After Aeronautical Business

The Tioga Steel and Iron Company, of Philadelphia, Pa., have entered the aeronautical field, making a specialty of hydraulic pressed cylinders for aeroplane motors. They have turned out a considerable quantity during the present year.

They are also prepared to accept orders for all types of steam hammer and hydraulic press forgings, and are very well equipped for turning out quantities of forgings in as short a time as is consistent with good work.

"Quick service" is their watchword.

Billy Thomasson, twenty months old, who made a flight with Johnny Green, at St. Petersburg, Florida, recently — the youngest passenger transported by aeroplane.

College Park an Aviation Station?

According to press despatches from Washington, D. C., tracts, adjacent to a number of military reservations, will be inspected by a board appointed by Secretary Baker, of the War Department, to select suitable grounds for aviation work. Announcement that the board will consider the question of availability of land at College Park indicates that the recent decision of the department against that site may be rescinded.

The tract which eventually is selected will become an aviation experimental station.

Members of the board are: Lieutenant Colonel George O. Squier, Signal Corps chief of Aviation Section; Captain Richard C. Marshall, Jr., Quartermaster Corps; Captain Virginius E. Clark and Captain Thomas DeWitt Milling, Signal Corps.

Radio Aerials on Zeppelins

The installation of wireless apparatus on board the German Zeppelins makes use of the metal framework of the airship for the capacity ground, and a trailing wire for the aerial. The latter is normally held on a large reel of light construction, fitted with wire spokes, which give it the appearance of a modified bicycle wheel. The aerial wire is ordinarily lowered after the oscillating circuit of the transmitter has been adjusted to the desired wave length. By watching the deflection of a hot-wire ammeter, the operator can determine when sufficient wire has been paid out to obtain a radiating system of a natural wave length the same as the oscillating circuit, or at least one that gives a high efficiency for the wave length chosen. The best results are secured when the maximum deflection is noted on the hot-wire ammeter.

LIEUT. A. B. THAW AND CHARLES REED PASS JUNIOR MILITARY TESTS

LIEUTENANT A. B. THAW, who was associated with the Aviation Section of the First Battalion of the N. Y. N. G., and Charles Reed, one of the students at the Aviation School on Governors Island, have passed the tests for junior military aviator. The following are the official reports of the tests:

REPORT OF TEST

(J. M. A., Charles Reed)

1. Aviation Section, Mineola, L. I., N. Y., August 5, 1916.
2. Junior Military Aviator's Test.
3. Machine No. 3 (Governors Island School Machine).
4. Observer: First Lieutenant J. E. Carberry, Signal Corps. Pilot: Charles Reed.

5. Test 1. Five figures of eight round pylons 1,600 feet apart, keeping all parts of machine inside circle of 300 foot radius. Performance satisfactory. Time of flight 15 minutes.

Test 2. Spiral down from 3,000 feet with motor completely throttled, change direction of spiral on way down, land within 150 feet of designated point, stopping motor before landing. Performance satisfactory. Distance from mark plus 59 ft. Time included in first flight.

Test 3. Land from 500 feet with dead motor within 100 feet of designated point. Performance satisfactory. Distance plus 84 ft. Time of flight 3 minutes.

Test 4. Land in field 600 by 100 feet, assuming 6 foot obstacles to surround field, stopping motor before landing. Performance satisfactory. Distance 150 yards.

Test 5. Slow speed test over measured course. Performance satisfactory.

Test 6. Straightaway cross-country flight of 90 miles, landing at end. Perfomance satisfactory. Flight made August 9th from Governors Island to Southampton (91 miles).

Test 7. One triangular flight of 60 miles (triangular with piremeter of 60 miles). Flight by compass and maps. Performance satisfactory (September 2). Flight—Mineola to Sayville (29 miles), Sayville to Smithtown (10 miles), Smithtown to Mineola (29 miles).

Test 8. Climb out of a field 900 by 1,200 feet and attain 500 feet altitude, keeping all parts of machine inside of square during climb. Performance satisfactory (September 2).

REPORT OF TEST

(J. M. A., Lieutenant A. B. Thaw)

1. Aviation Station, Mineola, L. I., N. Y., August 5, 1916.
2. Junior Military Aviator's Test.
3. Machine T. 78.
4. Observer: First Lieutenant J. E. Carberry, Signal Corps. Pilot: First Lieutenant A. B. Thaw, First Aero Co., N. G., N. Y.

Test 1. Five figures of eight around pylons 1,600 feet apart, keeping all parts of machine inside circle of 300 feet radius. Performance satisfactory. Time of flight 9 minutes.

Test 2. Spiral down from 3,000 feet with motor completely throttled, change direction of spiral on way down, land within 150 feet of designated point, stopping motor before landing. Performance satisfactory.

Test 3. Land from 500 feet with dead motor within 100 feet of designated point. Performance satisfactory. Distance, plus 8 feet. Time of flight, 3 minutes.

Test 4. Land in field 800 by 100 feet, assuming 10 foot obstacles to surround field, stopping motor before landing. Performance satisfactory. Distance 400 feet. (August 29, First Lieutenant H. S. Martin, Signal Corps, observer.)

Test 6. Straightaway cross-country flight of 90 miles, landing at end. Performance satisfactory. (August 9.):

Start	10:15 a. m.
Arrived Governors Island (20 miles)	10:53 a. m.
Departed Governors Island	1:25 p. m.
Arrived Easthampton, L. I. (97 miles)	3:44 p. m.
Departed Easthampton, L. I.	6:14 p. m.
Returned, Mineola (77 miles)	7:12 p. m.

Test 7. On triangular flight of 60 miles (triangular with piremeter of 60 miles). Flight by compass and maps. Performance satisfactory. (August 15.)

Start	2:40 p. m.
Arrived Smithtown (24 miles)	3:11 p. m.
Departed Smithtown	3:16 p. m.
Arrived Sayville (10 miles)	3:46 p. m.
Departed Sayville	4:20 p. m.
Returned Mineola (29 miles)	5:17 p. m.

Test 8. Climb out of field 1,200 feet square and attain 500 foot altitude, keeping all parts of machine inside of square during climb. Performance satisfactory. (August 29, Lieutenant H. F. Wehrle, 2d Ind., N. G., W. Va., observer.)

October 2nd was a sad, sad day for most of the members of the First Unit of the Aerial Coast Patrol—they had to report at College. In the center of the group is Mr. C. V. Mac Donald, of the Curtiss Aeroplane Company, and on the right, Mr. F. T. Davison, the organizer of the unit.

MOBILIZING OUR AVIATORS!

At the request of Lieutenant Colonel George O. Squier, head of the Aviation Section of the Army, we publish herewith a list of people who have, or are supposed to have been connected with aeronautics in the past decade.

Colonel Squier's letter to Aerial Age, transmitting the list, reads as follows:

> *"There is enclosed herewith a list of names of persons who it is understood have flown heavier-than-air machines in the United States. The addresses of few of these persons are known. Can you, through your journal or otherwise, make this list public, and, at the same time, ask those enumerated to communicate with the officer in charge of the Aviation Section, Signal Corps, War Department, Washington, D. C.? Their letters should state, (a) nationality, (b) age, (c) type of aeroplane and control they have flown, and (d) whether or not they desire service with the United States Army."*

This letter bears the signature of Colonel Squier (initialed W. M.), but we feel certain that he has not seen it. The person who compiled the list apparently did not know anything about aeronautics, and made the list up from the Year Book of the Aero Club of America, which is reliable and correct, and from publications and clippings that are not reliable, and did not check or investigate to establish the identity of the people mentioned and their connection to aeronautics.

As a result we find many names of bystanders who never really became connected with aeronautics, and many other curious mistakes have crept in this list.

We publish the list as sent excepting the names of those deceased, and so marked on this list.

This is, therefore, a list of civilians who, some time or other in the past eight years, have been reported as having flown in a heavier-than-air machine, or expressed their intention of flying, or constructed a heavier-than-air machine, or expressed their intention to do so.

As the letter from the War Department enclosing this list of names points out, some are natives, some are from foreign countries, and "the addresses of few of these are known" to the War Department.

One cannot look over this list without drifting back step by step in the past years and, while retrospecting, find an enormous amount of food for philosophizing.

We find here grouped together some of the pioneer inventors, who are now the leading aeroplane and motor manufacturers of the country; the pioneer sportsmen who took up aviation in those very early days when the aeroplane, while not less marvelous as a scientific achievement, was not built with consideration to the factor of safety; those pioneer aviators who thrilled our hearts with their early demonstrations that man, at last, had achieved the seeming impossible and actually navigated through the air, as he had dreamed to do for thousands of years.

We also find in the list scores of aerial acrobats who had been acrobats before taking up aviation and only came into this field to continue their profession. And here we find also the names of those humble folks who invested the earnings of a lifetime and mortgaged their properties and their relatives' properties to get enough money with which to build a 'plane!

And we see with a thrill the names of those red-blooded young men like William Thaw, Norman Prince, and others who learned to fly so as to be of service to our Government, but were told, as the National Guard is being told today, that they would never "amount to anything." They have since given demonstrations that they did amount to a whole lot.

This leads us to the National Guard, and we see in this list of names the names of men who made strong efforts to start aviation in the National Guard, and we realize the tremendous efforts that have been made to make the Federal Government adopt a fair attitude towards the National Guard. All in vain.

We also find a score of names or representative men who took up aviation at the time when the world at large considered flying as a "stunt," and when relatives, business associates and friends would combine their efforts to keep a man from being connected with aviation and being connected with it was supposed to be an indication of having an unbalanced mind. Therefore, in most cases, these men had to accede to their friends' behest and give up flying—excepting in the case where they continued their training under an assumed name, got their F. A. I. pilot certificate, and then stopped their activities, awaiting better times to continue their training.

We see here a host of names of men who spent all that they could afford, and could collect, but could never get sufficient funds together with which to continue their training in aviation and pass their tests for the F. A. I. pilot license as they started out to do. They were worthy enthusiasts most of them, deserving of a better fate, and remembering their pitiful appeals for assistance with which to continue their training, we cannot help but feel sorry that they could not be assisted in some way to continue their training.

As it is to be expected, there are many incongruities in this list. For instance, T. O. M. Sopwith, the prominent British pioneer aviator, now one of the leading constructors in England, is put down as not holding a pilot certificate. There is being overlooked the fact that Sopwith was one of the earliest British pilots holding the F. A. I. certificate issued by the Royal Aero Club of Great Britain. Likewise William Thaw, Elliott Cowdin and Norman Prince, three heroic members of the Franco-American Flying Corps, are set down as not having a pilot certificate, there being overlooked the fact that they hold the F. A. I. certificate issued by the Aero Club of France.

Likewise Louis Paulhan, George Dyott, and a number of foreign aviators, and American aviators like A. R. Smith and Robert G. Fowler are mistakenly listed as not holding the F. A. I. certificate. The famous Walter L. Brock is not given credit for his British F. A. I. certificate. Undoubtedly those who listed these names do not know that the F. A. I. certificate is recognized by the governments of thirty-five countries, which is the "ticket" and the "brevet" which the thousands of British and French aviators and aviators of other countries have had to take before receiving advanced training at military aviation schools; and the certificate without which no aviator may compete in an aviation contest or have his records recognized.

The two-scores of Japanese, Chinese and Mexican aviators whose names are given in this list will not, we fear, report to the War Department of the United States—for the reason that they are busy in connection with the upbuilding of the air service of their countries!

This reminds us that C. C. Witmer, Tony Jannus, Roger Jannus, W. E. Doherty, Beckwith Havens and several other veteran American aviators are permanently located in European countries.

It is somewhat funny to have to advertise to get into communication with Orville Wright, Glenn H. Curtiss, W. Starling Burgess, Glenn L. Martin, W. T. Thomas, Edson F. Gallaudet and other prominent constructors!

The hundred or so patriotic men who volunteered their services to the War Department at the time of the Carizal tragedy will be chagrined to find, after waiting all these months, that the Aviation Section does not seem to know of their whereabouts.

The names of Naval Constructor H. C. Richardson, Lieutenant S. W. Fitz Gerald, U. S. Army aviator; George Hallet, A. L. Allen, who are connected with the army and navy, have crept into the list. Likewise the names of a number of the National Guard officers who have been waiting for months at Mineola for the opportunity of getting training under the direction of the army.

Everybody will be curious to know the significance of the list of names of twelve women who have flown, or expressed their desire to do so—and Miss Ruth Law will wonder why she was included with the men!

The list with the certificate number of aviators follows:

Acosta, Bert	
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Adams, Baxter Harrison	294
Adams, Clarence	
Adams, W. F.	
Aldasoro, Eduardo	218
Aldasoro, Juan P.	217
Alden, John E.	
Alexander J. Morrow	335
Allinio, P.	
Alvarez, Francisco	78
Ambrose, Charles	
Ando, C.	
Andrews, Thornwell	
Andrews, W. D.	124
Appold, S. A.	
Apte, H. J.	
Armstrong, E. R.	
Arndt, Edw. F.	
Arnold, George H.	198
Astor, Vincent	
Atherton, W. S.	
Atwater, W. B.	98
Atwood, Harry N.	33
Auckerman, Frank	
Autin	
Babcock, W. C.	
Bach, James J.	
Bailey, J.	
Baker, G. H.	
Baldwin, Capt. Thos. F.	7
Barlow, Floyd E.	139
Barmeier, Geo.	
Barnes, Z. T.	
Barnett, A. E.	
Bass, Capt. Ernest C.	9
Bassow, Henry	
Bates, Mortifer F.	66
Baysdorfer, Chas.	193
Beach, A. C.	
Beachy, Hillery	89
Beasly, Percy C.	349
Beatty, Geo. W.	41
Beckly, Wm. A.	
Beckwith, E. P.	344
Beckwith, Sidney F.	137
Beech, Alex. C.	168
Beers, Earl	
Beers, Wm. C.	40
Belcher, Osmond T.	158
Bell, Grocer E.	201
Belory, P. P.	
Belt, P. P.	
Belton, Kaid	
Benedict, C. Ray	
Benner, Enoch	
Bennett, E. D.	
Benoist, Tom W.	
Bergdoll, Grover C.	169
Bergdoll, Louis J.	
Bergenthal, Klaus A.	222

Berlin, C. A.	109
Bernie, B.	
Best, Joseph	
Billard, Phil	
Bixler, John A.	246
Blakeley, H. L.	
Blakeley, Harold W.	
Blasier, Arhur	230
Blasiaer	230
Bleakley, Wm. H.	206
Boandette, Joseph	
Boddy, A. J.	
Boling, W. E.	
Bolognesi, Alfred	79
Bonette, C. C.	
Bonner, G. T.	
Bonney, Leonard W.	47
Boquels, Joe	
Bosdek	
Bouldin, Wm. 3rd	157
Bounds, Overton M.	322
Bowersox, Winfoeld E.	257
Bradford, Doyle	
Bragg, Caleb	
Bressman, A. A.	248
Brewer, E. D.	
Brewer, Griffith	307
Brewer, Roy	
Briggs, Alfred W.	340
Brindley, Oscar A.	46
Brinker, H. S.	
Britt, Edward	
Broch	
Brock, Walter L.	
Brodie, Otto W.	135
Brookins, Walter R.	19
Brown, Harold H.	58
Brown, Harry Bingham	
Brown, Lindop E.	267
Brown, Lawrence W.	310
Brown, Ralph M.	185
Brown, W. N.	
Brownfield, Cris	
Brubaker, August J.	283
Bryant, Frank	
Bryant, G. M.	208
Bulask, Herbert	
Bullington, Frank A.	
Bumbaugh, Capt. G. L.	
Burgess, W. Starling	136
Burns, A. C.	
Burnside, Frank H.	212
Bush, J. F.	
Butler, P. J.	
Butterworth, C. H.	
Cabot, Godfrey L.	
Callan, J. Lansing	102
Camon, Jack	
Carlstrom, Carl	
Carlstrom, Victor	144
Carr, Walter J.	
Carter, Verne	332
Cary, C. H. "Bud"	
Castori, Frank	261
Cessna, Clyde V.	
Chambers, William J.	
Champion, Frank S.	86
Chrildress, E. R.	
Christiansen, William	
Christmas, Dr. William W.	
Christofferson, Harry	
Christofferson, Silas	
Cline, W. F.	
Coffyn, Frank T.	26
Cole, Henry	
Cole, Ralph	
Coleman, R. F.	
Collier, R. J.	
Colovan, Peter	160
Cook, Clifton	
Cooke, Henry C.	
Cooke, Weldon B.	95
Cooper, John D.	60
Coram, B. M.	
Costello, A. B.	
Courturier, Claude	70
Cowdin, Elliott	
Crawford, Harvey	
Crewdson, Harry	
Crewdson, W. H.	
Crossley, S. J.	187
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Crowell, H. K.	239
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Culiford, P. E.	
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Curtiss, Glenn H.	1
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De Giers, Clarence A.	77
De Hart, D. C.	129
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De Kora, E. L.	
de Lamos, Raoul Kennedy	
De Murias, Ferdinand F.	38
Dennis, D. L.	
Derby	
De Remer, L. H.	115
De Vaux, Norman	
D'Villa, J. F.	
De Witt, W. V.	
Dickman, Frank A.	
Ditman, Alfred	
Dixon, S. D.	
Dodge, Wm. Earl	
Doherty, W. Elwood (Gink)	7
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Doi, S.	
Dougherty, Earl S.	87
Drexel, J. Armstrong	8
Drummond	
Dyott, G. M.	
Eades, H. W.	
Eames, John, Jr.	
Eaton, Warren S.	128
Eckert, Herman A.	
Ecob, Rbt. Gilbert	
Edelman, David	191
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Edwards, Stearne I.	350
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Eells, Fred	
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Farwell, John W., 3rd	
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Fisher, Phillip S.	
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Gaskell, Bud	
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Geary, Ted	
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Hamilton, C. E.	
Hamilton, J. W.	
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BOMB THROWING FROM AIRCRAFT

AEROPLANES and airships have often brought about severe damage in the present war by bomb throwing, in spite of the fact that the difficulties of hitting a definite target from rapidly moving aircraft are considerably greater than from guns standing fast on the earth. The reason for this is primarily that a bomb thrown from a flying machine does not fall vertically, but continues to move in the direction of the machine, so that the bomb must be thrown a definite time before reaching the target in question. Special sighting arrangements for the determination of this time forms part of the equipment of aircraft.

But before describing such arrangements we will first investigate the trajectories described in the air by the thrown bombs.

It is well known that if an object, for instance a stone, be dropped from the window of a moving train, it will strike the footboard at a point over the earth in advance of where the stone was released. If, instead of dropping the stone on the foot-board, it be dropped directly on the earth, it will likewise reach the latter at a later point than that over which it was released. The stone in falling has covered the same path as the moving train.

The trajectory of a bomb dropped from a moving aircraft is formed in a similar manner. Such a bomb is under the influence of two forces: one the forward movement of the aircraft, and the other the attraction of gravity. Under the influence of the resultant of these two forces the bomb describes a curved path from machine to the earth, in fact, a parabola if air resistance be neglected. Fig. 1 shows the path *p* of a flying bomb from machine *A* to target *B* under the assumption that the aircraft moves with uniform velocity in a horizontal direction above the target. At the instant that the bomb strikes the target *B* the machine is at *C*, vertically above *B*. The parabolic path results from the fact that only the horizontal velocity of the object thrown remains uniform, while the velocity in a vertical direction varies as the square of the time, for as is well known a falling body travels about 5 meters during the first second, in two seconds $2\times2\times5=20$ meters, in three seconds $3\times3\times5=45$ meters, etc.

If, for example, the aircraft is moving with a velocity of $v=40$ m. per second at a height $h=1000$ m., the distance s by which the bomb must be thrown in advance of the target results from the following consideration.

A body falling from a height of 1000 m. requires about 14 seconds to strike since $14\times14\times5=1000$ m. The bomb, must, therefore, be hurled 14 seconds before the aircraft reaches point *C* vertically over the target to be hit; in other words, the bomb must be thrown when the machine is over a point $40\times14=560$ m. in front of the target.

It is generally more convenient to determine the instant of dropping the bomb by means of the sighting angles than by calculating the distance *s* from the target, since in this case it is not necessary to observe a second fixed point on the earth. The bomb is then released when the target becomes visible to the eye of the observer under the previously determined angle $a_1=29°$ as is also shown on Fig. 1. As is readily seen, the distance in front of the target at which the bomb must be released increases with increase of height and increase of velocity of machine. In case the bomb is released only ½ second too soon or too late, it will strike 20 meters in front or behind the target. Airships have a better chance of hitting their targets than aeroplanes since they are in a position to reduce their speed at will or even to stand still when dropping bombs, provided they are not prevented by hostile aircraft and balloon defense guns. By standing still, airships can throw a number of bombs on the same target, whereas aeroplane must always take a new aim with every shot. The parabolic curve becomes more nearly vertical as the velocity of the aircraft diminishes becoming vertical when at rest. In this case the throwing angle a_1 becomes zero.

The uncertainty of hitting a target is still further increased by the fact that the object thrown travels through air and the trajectory does not, therefore, coincide exactly with a parabola, although the errors caused by air resistance can be suitably corrected on the basis of experiments. The effect of air resistance can also be diminshed by giving bombs a suitable exterior form.

An importance influence on the trajectory is caused by the wind. This causes an increase or decrease on the distance *s* depending on whether the bomb is thrown with or against the wind, while a side wind carries the bomb out of its trajectory plane. In addition, it often happens that the velocity and direction of the wind vary at different heights and that the trajectory consequently takes a different shape from that calculated, even when consideration is given to wind conditions in the immediate vicinity of the aircraft.

But even if it were possible to release the bomb at the determined time and to eliminate air and wind resistances, accuracy still depends upon corrections of height and velocity of machine from which the throwing angle is calculated.

For determination of the height, a barometer is employed giving fairly reliable results. From the heights determined with this instrument, the elevation of the target above sea level, which is taken off the map if not otherwise known to the observer, must be deducted.

The determination of the velocity of the aircraft at the moment the bomb is released is more difficult. It can be ascertained by the time required to cover a definite distance lying in advance of the target. If, for example, the bomb is to be thrown from *A* on target *B* (Fig. 2), then the time at which the machine passes over an object, such as a tower, house, or tree, *M*, is observed, and again the time at which it passes over an object *N* on the earth. By taking from the map the distance *MN* and the time of flight required to cover this distance, we are enabled to determine the velocity of the machine shortly before releasing the bomb. If, for example, the distance *MN* be 200 meters and the time required to cover same be 5 seconds, then the machine has an average velocity of $200\div5=40$ meters per second. The velocity of the machine may also be determined by observation of the angle of sight. In this case the distance from *M* to *N* need not be known. Preferably the angle b_1 at which the object *N* is visible to the observer at the instant of flying over *M* is determined and the time required for the machine to pass vertically over *N* observed.

It is not even necessary to sight upon an object on the earth in advance of the target, since the velocity of the machine can be determined by sighting directly upon the target itself as shown in Fig. 3.

In this case the observation instrument is set for a definite angle m_1, and the time noted at which the target, upon which the bomb is to be thrown, comes into view under the angle m_1. The instrument is now set for an angle n_1, which must be less than m, and the time again noted at which the target appears

(*Continued on page* 106)

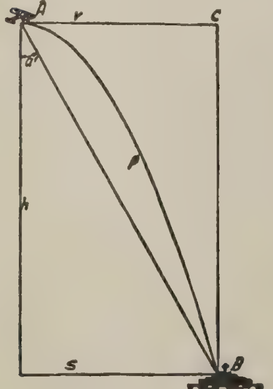


FIG. 1.

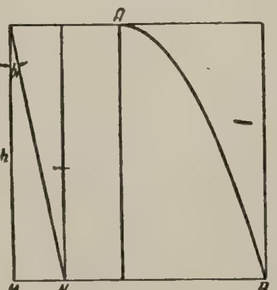


FIG. 2.

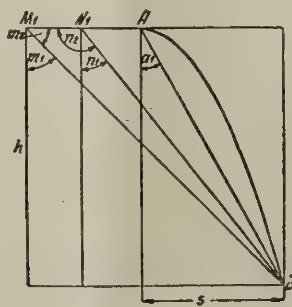


FIG. 3.

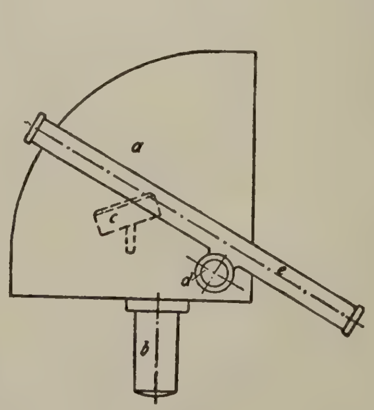
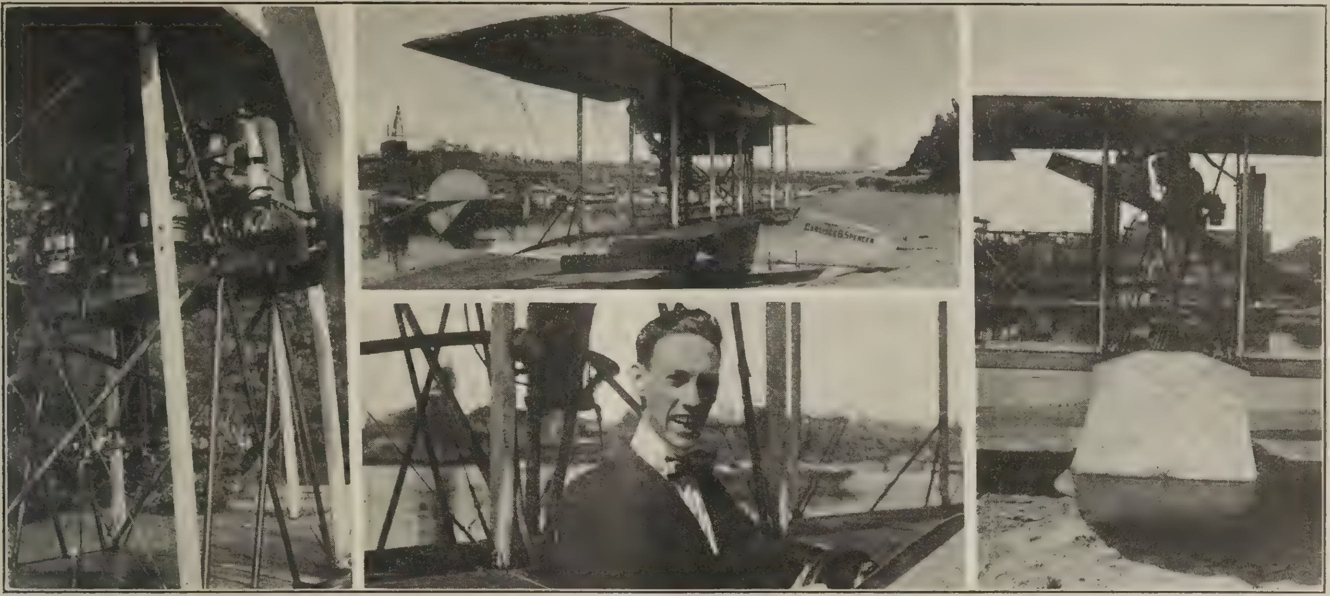


FIG. 4



SPENCER-CARLYLE FLYING BOAT

During the past summer Mr. P. H. Spencer, of Hartford, Conn., has been doing a good deal of passenger carrying with the flying boat illustrated. These pictures, taken in September, disclose some novel combinations in flying boat construction. One feature is the mounting of Wright-type wings on a Curtiss-type boat. Mr. Spencer has arranged the machine to be convertible for land use, and is at present using this land attachment with very satisfactory results.

The power plant is a late model six-cylinder 100 H.P. Roberts motor, and with this combination, a speed of over sixty-five miles an hour is obtained. The machine, preparatory to flight, weighs 1,300 pounds.

The general dimensions of the machine are:

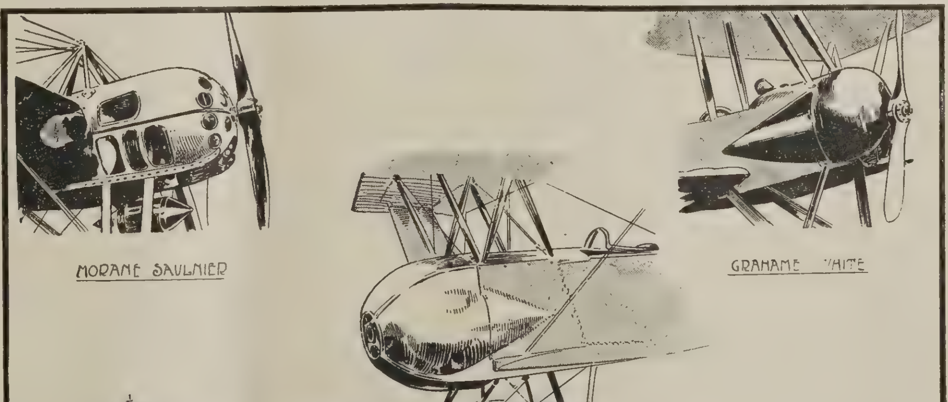
Top Span	39 ft.
Lower Span	30 ft.
Chord	6 ft.
Gap	5 ft. 6 in.
Length	23 ft. 6 in.
Height	8 ft. 6 in.
Motor	100 H.P.
Propeller	Excelsior

ENGINE MOUNTINGS ON BRITISH AND FRENCH MACHINES

The most modern form of engine mounting in use in Great Britain is that of the Grahame-White and Avro machines. In these the ball-race of the front bearer is supported on tubular extensions of the fuselage beams, the tubes serving at the same time as supporters of the engine cowl.

The mounting on the Morane-Saulnier is as follows: There are six T-section beams supporting one bearer just in front of the leading edge of the wings and converging to form a second one in front of the engine. The result is a structure of immense strength.

The cowling on the old all-steel monoplane (Morane-Saulnier) is highly interesting. Generally speaking, it consisted of two casings, one within the other. The outer one was supported in the fuselage beams and had openings cut in both the front and in the sides. Inside the cowl and behind the engine was another also of hemispherical form. The idea was obvious: after meeting the nose of the outer cowl part of the air is diverted and allowed to flow along the sides of the fuselage, and part is admitted to the engine housing through the openings on the sides. The rush of air past the holes in the sides of the outer casing will cause a suction that helps to draw the air out of the housing again, and in this manner the inner hemispherical shield helps in the egress of the air. This system was developed in an effort to provide low-head resistance, with sufficient cooling. In the illustration of the Nieuport it is seen that a hemispherical nose was mounted on, and revolved with, the propeller. Air was admitted through holes in this nose piece. In the Handley-Page there also was a nose, but this was stationary. In the Avro and Grahame-White military tractor the fuselage is narrower than the diameter of the engine and the cowl is made to run gradually into the flat sides of the body by a rearward extension of the cowl, shaped like a cone.



NEW·AERONAUTICAL·BOOKS

"Learning to Fly," by C. G. White and H. Harper

This book was written for the novice, by Claude Graham-White and Harry Harper. The authors have assumed in writing it that it will come into the hands of men who, having determined to enter this great and growing industry of aviation, and having decided wisely to learn to fly as their preliminary step, feel that they would like to gain beforehand—before, that is to say, they take the step of selecting and joining a flying school—all that can be imparted non-technically, and in such a brief manual as this, not only as to the stages of tuition and the tests to be undergone, but also in regard to such general questions as having once turned their thoughts towards flying, they take a sudden and very active interest.

It has been the authors' aim, bearing in mind this first and somewhat ruthless interest, to cover a wide rather than a restricted field; and this being so, their endeavor has not been to satisfy completely this first curiosity of the novice, but rather to stimulate and strengthen it, and guide it, so to say, on lines which will lead to a fuller and more detailed research.

It is from this point of view as a short yet comprehensive introduction, and particularly as an aid to the beginner in his choice of a flying school, and in what may be called his mental preparation for the stages of his tuition, that the authors desire their book to be regarded.

Claude Graham-White and Harry Harper need no introduction as authors of aeronautical works, their books having covered the many aspects of the flying game, and include such works as "The Aeroplane, Past, Present and Future," "Story of the Aeroplane," "The Aeroplane in War," "Heroes of the Air," "Aircraft in the Great War," "With the Airmen."

"Learning to Fly" is published by the Macmillan Company of New York, contains 110 pages and is illustrated with a number of full page photographs which were taken at the Graham-White Flying School, the London Aerodrome, Hendon, England.

"The Aeroplane"—By A. Fage

This book has been written to meet the requirements of engineers who are desirous of an introduction to the study of aeronautics. The fundamental principles of mechanics are unalterable, although the many interpretations and practical applications of such laws are the fruit of scientific labor.

The new science of aeronautics, which has necessitated a fuller understanding of the dynamics of the air, must now be regarded as a branch of engineering, although each step forward into the realm of aeronautical research seems but to reveal an ever-increasing unexplored region. The many unsound theories often advanced by well-intentioned people, who have had little opportunity to traverse the paths of aeronautical research, rather tend to confuse a new reader.

Reports of the several aeronautical laboratories have been drawn in the preparation of this book, and, as far as possible, no controversial matter has been discussed. Moreover, sketches and descriptions of aeroplane construction, which are of minor importance compared with a full understanding of the underlying principles of aeronautics, have only been considered briefly.

The author, A. Fage (A. R. C. Sc.), is at present an assistant in the Aeronautics Department of the National Physical Laboratory, Teddington, England, where he has conducted researches on air screws, airships and aeroplane fabric. Mr. Fage was awarded a Royal Exhibition by the Board of Education; Associate of the Royal College of Science; awarded an Aeronautics Research Scholarship by the Imperial College of Science and Technology; awarded the Diploma of the Imperial College for research work in aeronautics; elected an associate Fellow of the Aeronautical Society of Great Britain.

The book is published by Charles Griffin & Co., Ltd., London, and is sold for 6 shillings. Its popularity is attested by the fact that the first edition was sold out in six months, and the second edition, published in April, 1916, was sold out in August. The second edition, revised and enlarged, contains 166 pages, and more than 60 drawings, diagrams and photographic illustrations. The contents are divided into chapters which deal with winds, streamline bodies and struts, wings, construction, equilibrium, stability, propellers, and engines.

A New Book on Design

A general review of the principles of aeroplane design is treated in an understandable form in a new book by F. S. Barnwell, entitled "Aeroplane Design," published by McBride, Nast & Co., of London. Mr. Barnwell's references to stability are made even clearer to those who have not hitherto studied aerodynamics, by the simple explanation of the why and wherefore of aeroplane stability, which is covered in the second part of this volume by W. H. Sayers.

Mr. Barnwell, who is well known as a highly successful designer, holds a commission in the Royal Flying Corps. The section of the book written by him formed a treatise read before the Engineering Society of Glasgow University. Mr. H. W. Sayers was one of the first properly trained engineers to take an active interest in aviation. He has been intimately connected with the aircraft industry since the earliest days of aeroplanes, and has worked indefatigably both at construction and design. He made a special study of stability in aeroplanes in the days when most of the pilots of today had never seen an aeroplane, and not more than a dozen people in this country could fly. The theories he then involved by rule of thumb, have since proved mathematically correct. At the beginning of the war he joined the Royal Naval Air Service, and has since been promoted to lieutenant.

The speediest machines in the British Army, the Bristol Scouts, were designed by Mr. Barnwell, with the practical help of Mr. Harry Busteed, an Australian aviator, now an officer in the Royal Flying Corps. His general method of design is approved by other aeroplane designers who have been successful in producing efficient and effective aeroplanes. Consequently, those interested in aircraft design may feel safe in following his methods.

The value of the book is increased by the numerous explanatory diagrams and tables which appear in both sections. The volume, containing more than one hundred pages, is sold for 66 cents, plus postage to America.

"The Airman"

Experiences while obtaining a *brevet* in France, by Captain C. Mellor, R. E. Although the book was written merely as a record of Captain Mellor's experiences and not really intended for instruction purposes, it should prove of interest and help to anyone about to take up a course in flying.

Some of the objects of this book are to convey to some who can only regard aviatin as "flying in the face of Providence," a more accurate idea of what is actually involved in the way of risks and difficulties, which is considerably less, for instance, than mountain climbing; to certain others who might be hesitating whether to take the step or not, to give the last needed touch; and to certain others, again, who have formed the impression that the licensed pilot necessarily knows all about flying, to point out that he is only at the beginning of two or three years of constant training and practice necessary to make a perfect pilot.

John Lane & Company publish the book, which is sold for one dollar. It contains 125 pages and is illustrated with eight full-page photographs. In the appendix are added for reference the rules under which the following pilots' certificates are granted: Aviator Certificates, Royal Aero Club Special Certificate, and the French Militaire Brevet.

"Industrial Preparedness," by C. E. Knoeppel

When the soldiers of Europe lay down their arms a commercial war will begin. They are already preparing for it. Behind German preparedness was an industrial preparedness never dreamed of by the rest of the world. The necessities of the war are forcing the European nations to an industrial efficiency never before dreamed of. They have undertaken and accomplished in their factories things which were thought impossible before the war, and they will be carried on after the war is over. When the war is over, we are sure to be confronted with the keenest competition of manufacturing and commerce, and we must now eliminate those things which make for waste, and inaugurate industrial preparedness.

A great many manufacturers in the United States are working along antiquated lines, but European factories are now working along highly efficient lines. Our prosperity for the next twenty-five years will depend upon what we determine in the next twenty-five months.

Let us wake up and get busy! This book tells us how. Published by the Engineering Magazine Co., 12mo. Cloth, price $1.00.

FOREIGN NEWS

FRANCE.

The officers in charge of the artillery in the French Army on the Somme front have figured out with mathematical precision how many shells to the square foot are needed to clear the way of wire entanglements for the attacking forces.

When it comes to the destruction of ground defensive works, experience has shown that the best way to deal with front line trenches, especially when they are not easy to observe, is to use exclusively against them an enormous number of trench mortars of all sizes. Howitzers are only used at present against the second and third lines, and all works behind the first line trenches. As it is, their task is already a sufficiently heavy one, and it assumed that every inch of ground must be plastered with shells.

Once this work of preparation was over, the great problem was to safeguard the attacking troops, as they moved forward, by a protective curtain of shells, which had to be lifted ahead in accordance with the ground gained. Here, owing to the difficulty of keeping artillery exactly informed as to movements of infantry, the only solution, which was found for a long time, was to regulate exactly beforehand the movements of the attacking troops and lengthen the artillery range by a clockwork schedule. This left a considerable margin for mistakes and miscalculations, as the advance of the infantry was not always according to schedule.

With the aerial supremacy obtained by the Allies on the Somme front came the best solution of the problem.

Communication between the advancing infantry and the artillery is maintained by aeroplanes, Captain Mille says. Each French division is now provided with a number of so-called infantry aeroplanes whose task it is to follow closely the advancing line, not in order to fire on the enemy, but, simply to report to the gunners and let them know exactly what is going on. As soon as the infantry have reached a given point, the 75's are informed that they must lengthen their range beyond it so as not to hit their own men. Information is similarly given if the infantry happen to be held up by any unsuspected obstacle or if a German counterattack is seen coming up from the rear.

The way in which this new device is worked on the Somme is marvelous. It is mainly due to the scientific system that the troops have been able to advance under a curtain of shells which moved continuously ahead of them at a distance of 200 or 300 yards.

These points explain why the French losses have been reduced so materially in spite of the almost continuous offensive.

GERMANY.

Lieut. Wintgens, who since the death of Immelman has stood next to the famous Boelke as Germany's leading aviator, has been killed in an engagement with the Allied aviators. He was buried according to his wish at the spot where he fell.

The death of Kiffin Rockwell has caused many German newspapers to raise a cry against the unneutrality of the United States. They at first demanded a renewal of the submarine warfare, but later official reports from the Government have stated that as the Americans in the French Flying Corps are volunteers, the accusations are groundless.

GREAT BRITAIN.

Thirty-six persons were killed and twenty-seven injured in the second Zeppelin raid of forty-eight hours which took place on September 25.

It was at first officially announced that the number of deaths was twenty-nine. The first announcement follows:

Seven airships raided England last night and in the early hours of this morning. The districts attacked were the South Coast, the East Coast, the Northeast Coast and the North Midlands. The principal attack was aimed against the industrial centers in the last mentioned area.

Up to the present time no damage to factories or works of military importance has been reported. It is regretted, however, that a number of small houses and cottages were wrecked or damaged at some places, and twenty-nine deaths have been reported.

No attempt was made to approach London. The raiders were engaged by our anti-aircraft defenses and were successfully driven off from several large industrial centers.

An interesting account of the industrial progress made by Great Britain in the manufacture of aircraft is contained in the New York Evening Mail of September 26 in an article written by S. S. McClure. Part of his story follows:

The manufacture of aeroplanes is going on on a huge scale, it being the fixed intention of England to extend her aerial navy and secure the same domination in the air as she has on the sea. England is an island only so long as she can protect herself against air, sea or undersea raids. She is, therefore, expending enormous sums to counteract the submarine and to insure the complete mastery of the air.

One little establishment, a small part of which is devoted to aeroplanes, is just increasing facilities to produce fourteen a week. I am told the number of aeroplanes turned out is considerably over fifty a day and will soon approach one hundred a day in the British Isles.

One of the establishments I visited employed 10,000 people. It is a small portion of the plant of a great munitions concern. Seven thousand of these employees are women. In one factory it was almost impossible to see the other side in either direction, and this factory almost as big as several city blocks was occupied almost solely by women working at their lathes producing parts of shells. There were acres and acres of women forming an insignificant portion of the million women now working in munition factories.

The renewal of the Zeppelin raids over England and the publication of Continental dispatches quoting various German newspapers' demands for a renewal of the war of "Frightfulness" coupled with Count Zeppelin's demands for the launching of a fleet of eighty airships against London, have given the British advocates of reprisals a fresh spur.

The British cite the case of France which, by adopting a policy of stern reprisal for air raids on its unprotected towns has virtually caused Germany to abandon these raids.

The menace of air attacks upon the number of German towns within easy reaching of England would immobolize a large body of forces needed for their protection. It would mean the enforced placing of anti-aircraft guns and gunners, searchlight operators, airmen, aeroplanes and anti-aircraft, thus taking these defenses away from other very important points.

In a raid over the east coast of England, another Zeppelin was brought down on the night of October 1st, making a total of four in one month.

At a place which can be designated only as "somewhere in Egypt," the British forces are establishing what will be one of the largest and most completely equipped aviation schools in the world. An Associated Press correspondent, who recently visited the site, found the school was nearing completion, and he was told that at least seven thoroughly qualified pupils in the art of flying will be graduated each week so long as the war lasts, for service not only with British forces in Egypt, but elsewhere if their service was demanded.

This part of the world was chosen for the school mainly because it is adapted climatically to flying the whole year round, and because it is handy to the various theatres of war. Incidentally an observer here might remark that the sands of the desert also furnish a soft bed for the inexperienced to fall upon.

The school will accommodate, in addition to the pupils, fifty officers and 500 mechanics and other workers. Each student will require from four to six weeks' training. A large number are already receiving instruction.

ROUMANIA.

Sixty persons have been killed and a large number wounded by bombs dropped on Bucharest by enemy aircraft. Two thirds of them were women and children. Five of the children lost their lives in a Zeppelin raid.

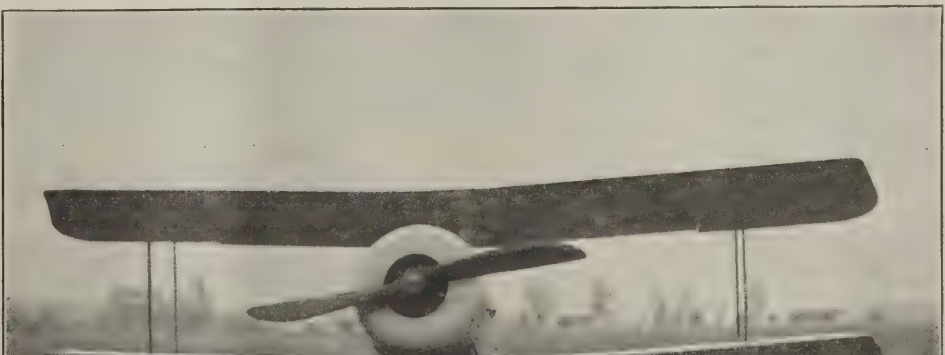
In reprisal Roumanian aviators have dropped bombs on a military camp in Transylvania.

RUSSIA.

On Sept. 28th, the Russian aviators were very active, bringing down four enemy aeroplanes. They conducted a raid on Boruny and Krevo. Two Russian machines, a biplane and a Morane parasol machine were brought down by the Germans.

The Bristol Scout.

A fast British reconnaissance machine.



MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz

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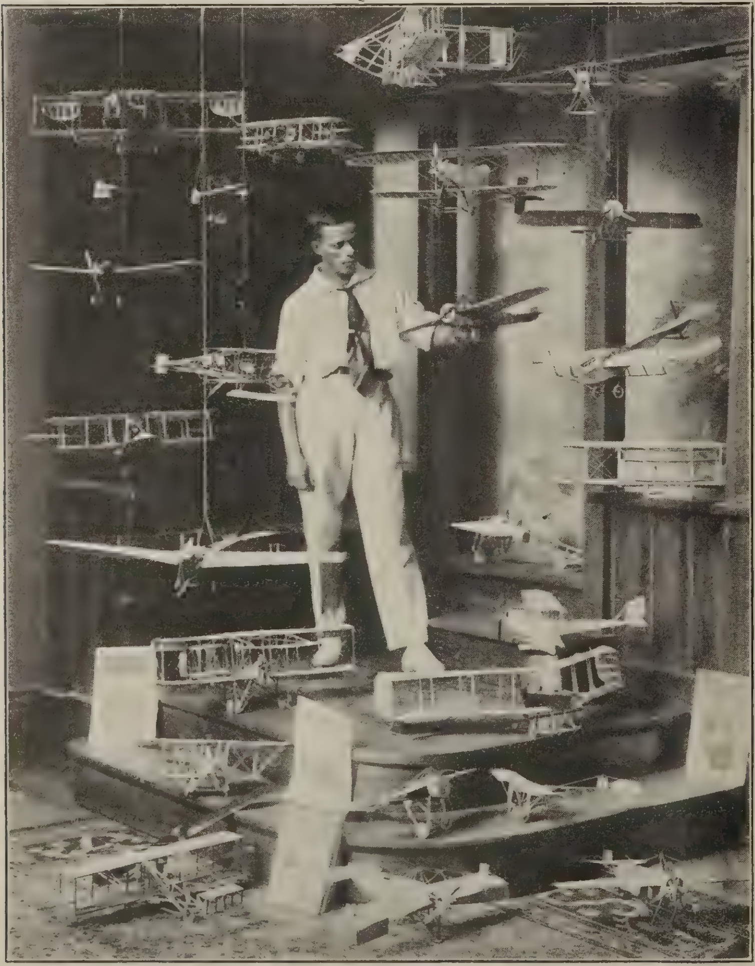
New World's Record Made at Aero Science Club Contest

On Sunday, September 30th, 1916, at Glen Ridge, N. J., a new world's record for R. O. G. models for duration was made by Charles W. Meyers, of that town, a very active member of the Aero Science Club. This flight, which lasted 178 seconds, breaks the record of an English modelist of 169 seconds, which has been standing for several years.

With a pair of rubber motors in the last stages of decay, the flight was made. After a run of approximately three feet, the model rose from the ground at a very steep angle, and at first appeared to be over-elevated. With its nose pointed almost straight upwardly, the tiny craft climbed, in ever-widening circles, until almost a speck in the sky. After circling for ninety seconds, its delapidated motors drooped, the propellers ceased their whirring, and the model pointed its nose to earth, and gliding at a very flat angle, descended. The glide to earth consumed a period of 88 seconds, making the total flight 178 seconds. The little craft was perfectly balanced at all times and in its glide it seemed to climb at times instead of descending.



Mr. C. O. Dumm of Boulder, Colorado, and some of his models. Evidently Mr. Dumm is actively interested in model construction work.

The flight was timed by Messrs. Lott and Schultz of the Aero Science Club of America, and was witnessed by about a dozen other members of that organization. The Meyers model was very consistent in its performances, practically all of its other flights being far over the century mark.

Other noteworthy flights were made, at this contest, by E. P. Lott, whose continuous efforts netted him flights of 100, 105 and 107 seconds. The spectators were also amused by the actions of the speed models flown by Messrs. Lott, King and Hodgins. These models looped the loop, dipped and dived in a manner to generally jeopardize the lives of the spectators.

At the other end of the field, the Aero Club engine-driven model contest was in progress. When the writer of these lines appeared on the scene of that affair, two of the chief contestants, Messrs. Thiele and Conklin, appeared to be ready to expire from exhaustion caused by an over-zealous attempt to pump an air tank to a pressure of 250 pounds, which tank had a leak finally discovered at the close of the contest. In spite of this misfortune, the above-named contestants were persistent in their efforts and their official flights were as follows: Thiele, 17 seconds, 14 seconds, and 10 seconds; Conklin, 15 seconds, 12 seconds, and 5 seconds. These flights were timed by Mr. Edward Durant of the Aero Science Club.

Further particulars of the Meyers model and the Thiele and Conklin models will be published later.

Aero Science Club of America

At the last meeting it was unanimously voted to elect Mr. Augustus Post, one of America's leading balloonists, an honorary member of the Aero Science Club of America. Mr. Post has shown considerable interest in model aeronautics and for the past few months has been active in connection with the National Model Aeroplane Competition. In accepting the honorary membership to the Club, Mr. Post said in part: "I appreciate fully what the Aero Science Club of America has been achieving, and I think there is a broad field for development in model construction, flying and adaption to various practical uses. The development of aerial torpedoes or bombs, whether controlled by some mechanical device or free [illegible]ires practice and skill in the building of their surfaces and controlling devices. The preparation of patent models and illustrative models of all kinds is, I am sure, a part of the activity which is fostered by the Aero Science Club of America."

Under date of September 30th, Mr. Post spoke to the boys of the Bedford Avenue Y. M. C. A., Brooklyn. He spoke of his various experiences with balloons both in this country and abroad, all of which was very warmly appreciated by the boys of the Y. M. C. A. Mr. Cavanagh, who is the author of "Model Aeroplanes and Their Motors," then addressed the boys on the subject of model aeroplanes, outlining the growth of model aviation from the year 1907, when the first model Aero Club was formed by Mr. Edward Durant, now director of the Aero Science Club, up to the present time when the world record for distance is over one mile. The boys were very much interested in the subject and it was decided to form a club. Mr. Cavanagh will assist the members in forming the club until the election of a director.

All members desiring to enter the October contest of the National Model Aeroplane Competition will kindly get in touch with the Secretary at once.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

To Fly Around the World—Maybe!

Congressman J. A. Oskz, whose magnificent speech we recently reported, fired with ardor (Hennessy's Triple X) by the accounts of the wonderful progress being made in Europe, has formed an aeroplane company, the purpose of which is to build aeroplanes capable of circumnavigating the globe in one week. One *week*, because that is all the time the Congressman can spare from his labors of doing good for his constituents—believe us, he does them *good!*)

Our intrepid reporter took the midnight train for Ossawotomie County, and arriving there the next night crawled up to the hangars and viewed the magnificent machine at rest. We are able to give the following details about it:

It will be a biplane with two six-bladed propellers. The Congressman has figured out that if an aeroplane can go one hundred miles an hour with a two-bladed propeller, it ought to make at least five hundred miles with a six-bladed one. Progress on the machine was delayed a bit at the start, as the designer had a few odd plumbing jobs to attend to. The most remarkable thing about the plane is that the motor power will be furnished entirely by compressed air, thus enabling the machine to be operated without any expense. If compressed air will not work, the company plans to take some of the hot air from its prospectus. The machine will be built entirely of steel, being the strongest yet manufactured. The makers claim that it will be impossible for an accident to take place owing to the great strength of the apparatus. They are not quite sure whether its great weight will permit of its flying, but they will test that out on the initial trip. Another remarkable feature of the aeroplane will be its fuel capacity. Allowing eight quarts apiece for the passengers and the members of the crew, the fuel capacity will be about five hundred gallons.

The aeroplane will be lavishly equipped with all the appurtenances which go to make up comfort for the passengers. There will be a pool table equipped with gyroscopic balls so as to run straight across the table, a bowling alley, a ball room and—yes, there will be a bar. However, there will be nothing stronger than straight whiskey served at the bar. The Congressman is now working on a gyroscopic stableizer device to aid the passengers in getting out of the bar after they get in. It has been rumored that Hashimura Togo, the peerless Japanese pilot, will steer the aeroplane on its initial trip. Our Russian correspondent interviewed Hashimura in the Russian Prison Camp in which he is interned, and asked him for the straight dope on the question. Says Hashimura, "As noblest blood of bluish color runs through my vein such proceeding will be extemporous for me. Banzai!"

The same correspondent, hurrying back from Russia, went up to interview the Congressman who is now in New York City. He was found after a long search, making a speech before a large crowd in Central Park. (Almost five of the crowd were listening to him.)

"Ladies and gentlemen," he said, "you have no doubt read of my new aeroplane in the daily press, and I wish to say a few words to you this evening concerning it. The aeroplane will set out from New York City some time in the future and will make the trip around the world in one week if everything goes right. If anything goes wrong time will not worry us. Ladies and gentlemen, the trip will be made! (Cheers.) And after we return I propose to establish an aeronautic school founded on the experiences undergone while designing this machine. In conclusion, my friends, I will say that the schoolhouse is the woolbark of civilization. Ah, that is to say, the bullschool is the work house—— The Congressman paused and mopped perspiration from his brow, and started anew. "The school house" (he now spoke with confidence), "the schoolbull is the house-work"—— At this point some sympathetic friends led the Congressman off with tears in their eyes. (Particulars of the flight will be printed as soon as it takes place.)

No Wonder!

It seems that the youth had just completed his course at the aviation school and was about to go into exhibition work. Being desirous of getting the correct outfit for the work, he wrote to a large furnishing house for information. The clerk who opened the letter gave it to the livery department by mistake, and the head of that department sent the following reply:

"Dear Sir:

"In response to your inquiry of recent date. The correct outfit is as follows: Bottle-green coat, fawn-colored trousers, with top boots, silk hat with cockade, eight-foot raw-hide whip."

The youth replied: "I always was told that it was an expensive game and your outfit seems a trifle elaborate. But even putting that aside, what in the Lord's name am I going to do with a whip?"

Humoring Him

This is not aeronautical but it is too humorous to pass by.

It was five A.M. and the husband had just returned from his lodge banquet slightly the worse for wear.

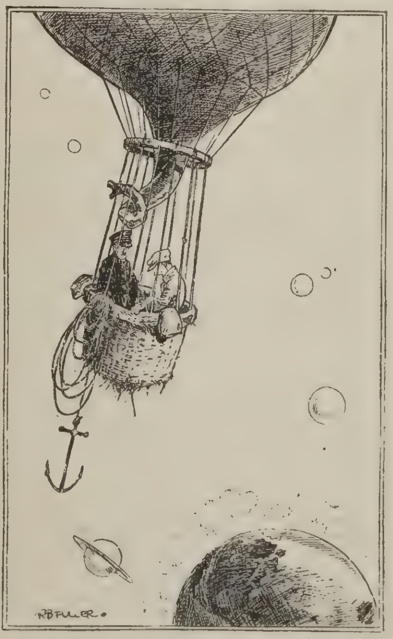
The banqueter let himself in noisily, and then he began to growl and swear at a fearful rate down in the hall.

"What's the matter?" called his wife.

"Matter ish," the banqueter called back, "there's two hat-racks down here, and I—hic—dunno which t'hang my hat on!"

His wife laughed, and said in soothing tones:

"But, dear, you've got two hats, have'nt you? Hang one on each rack and come on up to bed. I know you're tired."—*London Opinion.*



Nervous Passenger: THE BOTTOM OF THIS BASKET DOESN'T SEEM VERY STRONG.
Balloonist: OH, WELL, IF IT FALLS OUT I'LL GET ANOTHER BASKET.

Curtiss

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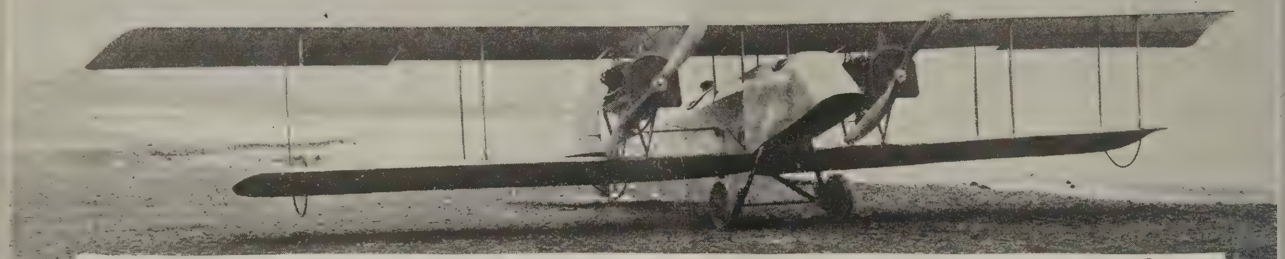

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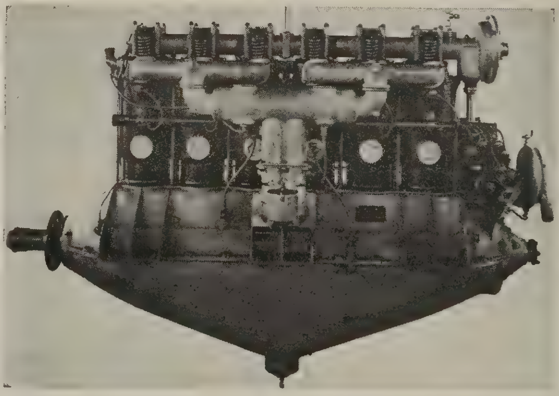

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(*Continued from page* 90)

training and gaining efficiency under the direction of the Army, establishes a policy which enables us to have a body of trained aviators, who are made available to meet a national emergency.

The air service of first and second class powers has developed tremendously in the last two years, and today there are not less than half a dozen countries having each between 2,000 *and* 9,000 *aviators. If national safety demands that we, too, develop our air service until we have thousands of aviators available to meet an emergency, this policy enables the majority of them to be employed in peaceful pursuits, using aeroplanes as vehicles of transportation, for sport, carrying mail, coast guard service, and other utilitarian purposes.*

The Executive Committee has studied very carefully the provisions of the National Defense Act of 1916, *for the developing of the aerial defenses in connection with the land forces, and finds that adequate provision was made in the Act for the practical mobilization of the military and volunteer resources available to form an extensive plan of aerial defenses.*

Sections 37 *and* 55 *very admirably provide for the directing of the impulses and efforts of patriotic citizens who wish to become part of the Aerial Reserve Corps, making it possible to form a reserve comprising* 296 *aviators and* 2,000 *enlisted men; the Federalizing of the Militia makes it possible to develop the twelve aero corps for the twelve Militia Divisions, under the direction of the War Department, maintaining the standard of the Regular Army; Section* 13 *provides for the increase by authorization from you, of the personnel of the aviation section of the Army, the five increments, providing sufficient personnel to enable the aviation section of the Army to thoroughly supervise the organizing of the Aerial Reserve Corps and the twelve aero squadrons for the twelve Militia Divisions.*

The Executive Committee of the Aero Club has learned from Senator George E. Chamberlain, Chairman of the Senate Committee on Military Affairs, and Congressman James Hay, Chairman of the House Committee on Military Affairs, that the Committees of both Houses approve the proposed appropriation of $13,281,666 *for the developing of aviation in the Army and Militia, establishing the Aerial Reserve Corps, and providing for developments of a technical nature to increase the efficiency and utility of aircraft.*

The new Defense Act, therefore, provides most admirably for the immediate mobilization of the military and volunteer resources to form an extensive plan of aerial defenses.

Again expressing our appreciation of the personal interest you have taken in developing our aerial defenses, and assuring you that the Aero Club of America will continue to co-operate in every way possible in the accomplishment of this purpose, I beg to remain

Very sincerely yours,
(Signed) ALAN R. HAWLEY,
President, Aero Club of America.

But these provisions were never carried into effect and progress in training the National Guard and civilians has completely stopped. Therefore, having exhausted all other means of bringing about action, it becomes our duty to make these conditions public. Having no interest other than the upbuilding of our aerial defense and the developing of our aerial resources for national defense, we would, of course, be glad if the conditions were otherwise than they are. Therefore, we present herewith only facts which are substantiated by evidence, and will welcome any evidence that can make the situation look better than it appears to us at present.

Very respectfully yours,
(Signed) ALAN R. HAWLEY,
President, Aero Club of America

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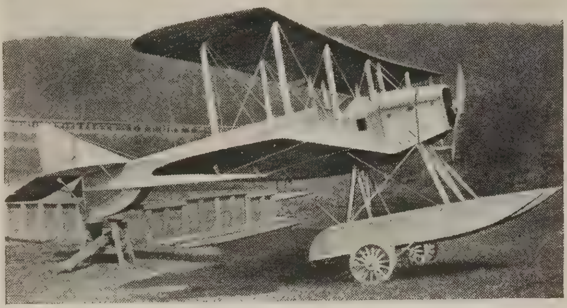

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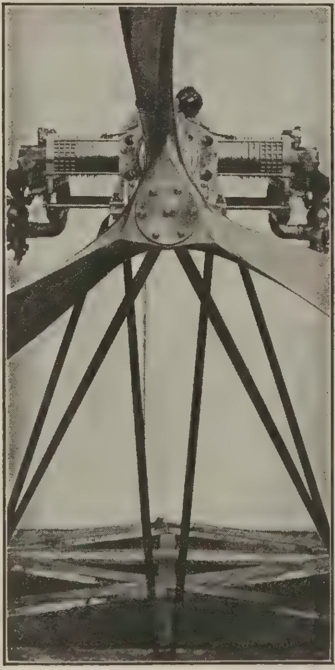

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(*Continued from page* 98)

under the angle n_1. From the number of seconds required for the machine to travel through the angles m_1 and n_1, and from the height of fall h, the velocity of the machine over the distance M_1N_1 can be determined. The length of M_1N_1 is arrived at from the triangle M_1N_1B three of whose parts are known: height h and angles m_2 and n_2; angle m_2 being equal to $90^\circ - m_1$, and angle $n_2 = 90^\circ + n_1$. The quotient of the distance M_1N_1 in meters divided by the time of flight in seconds again gives the average velocity of the machine in meters per second. From the velocity so determined and from the height of flight, the angle a_1 at which the bomb must be thrown can be calculated.

Fig. 4 shows a sighting arrangement which permits of setting the three angles m_1, n_1, and a_1, shown in Fig. 3. The arrangement consists of a frame a whose sides have the form of a quadrant. On the under side of the frame is a pivot b by means of which the frame can be set up on a vertical tube of the machine or other suitable opening. To the rear side wall of the frame is attached a clock c while the front wall has a pivot d upon which turns a telescope e. The center of the pivot is also the center of the angular arc. This arc is graduated by scales from which the line of sight of the telescope is read. The lower position of the scale serves for setting the height of flight and the upper part for setting the seconds. The angle of sight n_1 is most suitably set at a definite mark on the scale and, therefore, remains always the same.

The arrangement is handled as follows. Assume the machine to be moving in the direction of the target at a definite height read from the barometer, account being also taken of the earth elevation.

The telescope e is first set on that division of the scale corresponding to the determined height of flight. The telescope is then pointing down under the angle m_1 (Fig. 3). The time is then recorded at which the target appears in the telescope and the latter immediately set at the angle n_1. The time is then observed at which the target again appears in the telescope (stop watch). The telescope is set for a third time, and this time on the upper scale of seconds corresponding to the number of seconds recorded by the clock. The line of sight is now at the angle a_1 (Fig. 3). As the target appears for the third time in the telescope, the bomb is released and flies in the trajectory shown in Fig. 2, provided all assumptions agree.
—*Technische Rundschau.*

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of Aerial Age Weekly, published weekly, at New York, N. Y., for October 1, 1916, State of New York, County of New York. Before me, a notary public in and for the State and county aforesaid, personally appeared G. Douglas Wardrop, who, having been duly sworn according to law, deposes and says that he is the business manager of the Aerial Age Weekly, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, The Aerial Age Co., Inc., 280 Madison Avenue, New York; Editor, G. Douglas Wardrop, 280 Madison Avenue, New York; Managing Editor, G. Douglas Wardrop, 280 Madison Avenue, New York; Business Managers, G. Douglas Wardrop, 280 Madison Avenue, New York; G. A. Cavanagh, 280 Madison Avenue, New York.

2. That the owners are: The Aerial Age Co., Inc., 280 Madison Avenue, New York; Henry Woodhouse, 297 Madison Avenue, New York; G. Douglas Wardrop, 280 Madison Avenue, New York.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above, is (this information is required from daily publications only).

G. DOUGLAS WARDROP,
Business Manager.

Sworn to and subscribed before me this 2nd day of October, 1916.
[Seal] WESLEY W. FERRIN,
Notary Public, Kings County.

Certificate filed in N. Y. County, No. 87. New York County Register No. 7120. Term expires, March 30, 1917.

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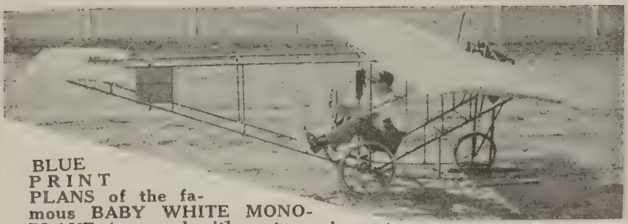

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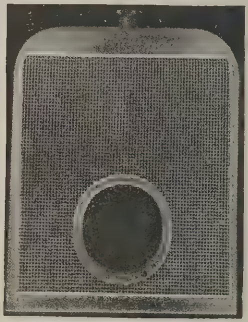

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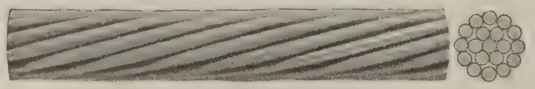

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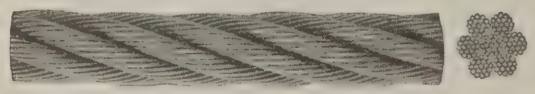

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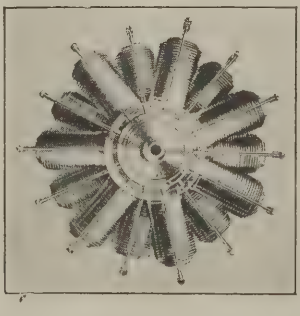

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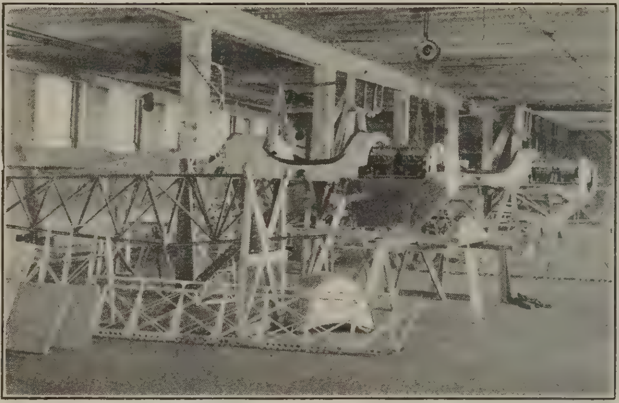

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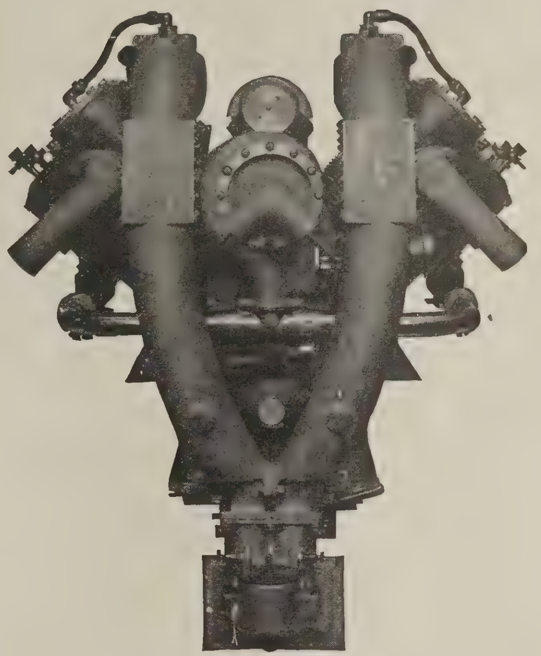

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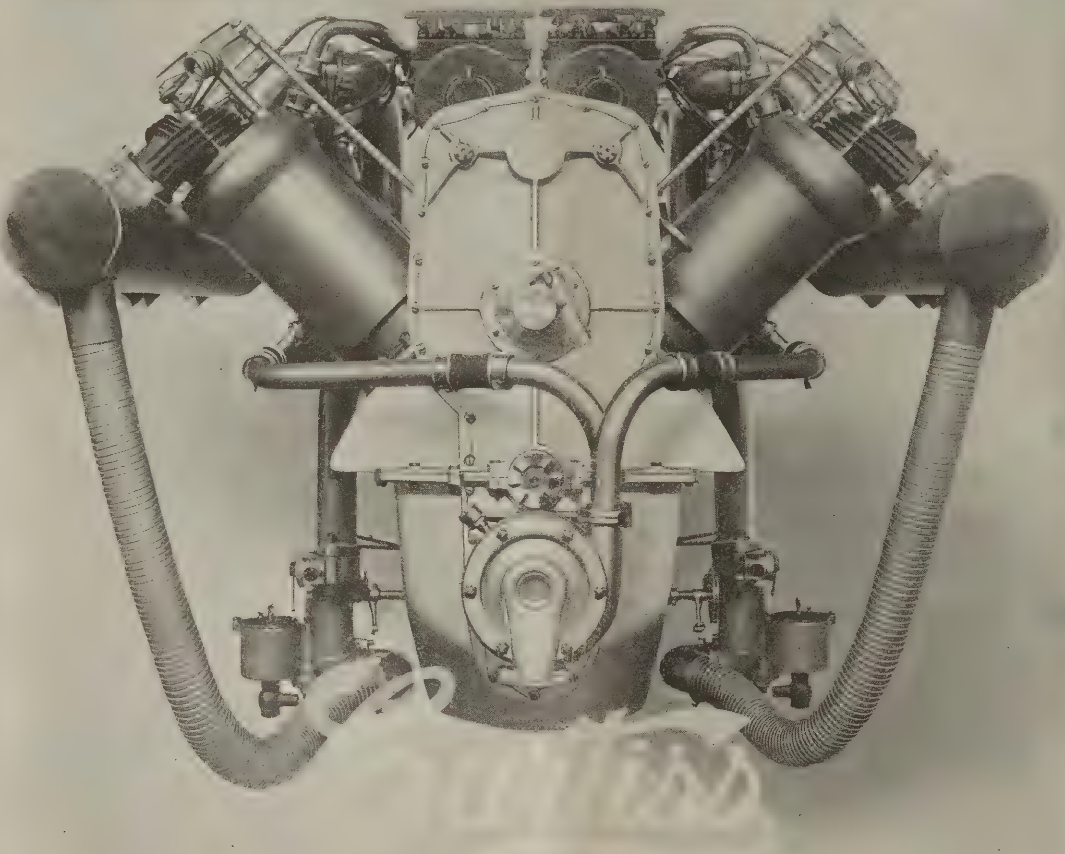

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Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

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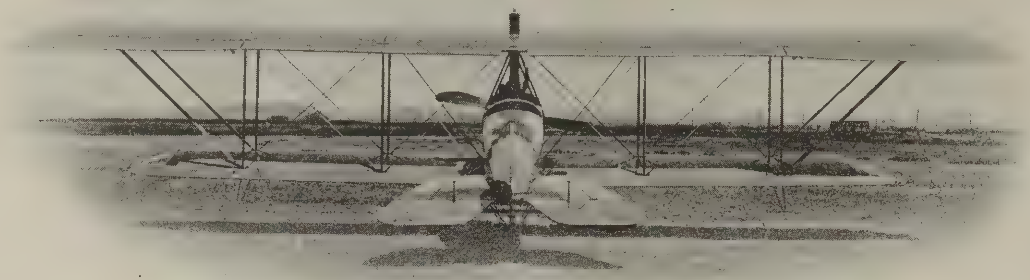

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VOL. IV NEW YORK, OCTOBER 16, 1916 No. 5

MR. HAWLEY ASKS THAT ORDER LIMITING AVIATION TRAINING OF NATIONAL GUARD BE RESCINDED AND COMMITTEE BE APPOINTED TO INVESTIGATE CONDITIONS

Submitting that the order which limits the number of National Guardsmen to be trained in aviation should be rescinded, and asking Secretary Baker to appoint a committee to investigate the whole subject of military aeronautics, Mr. Alan R. Hawley, president of the Aero Club of America has written to Secretary of War Baker, as follows:

Dear Mr. Secretary:

The announcement that the War Department is planning to conduct virtually a house to house campaign throughout the nation to obtain 100,000 regular Army recruits makes me realize the necessity of taking steps to try to revive the interest of the hundreds of enthusiasts who volunteered to join the air service, but have become discouraged.

On October 2d I wrote to you, submitting evidence that Congress has allowed $9,640,800 for training and equipping National Guardsmen in aviation and, therefore, the order issued on September 8th, which limits the number of National Guardsmen to be trained in aviation to fifty, and states that Congress has only appropriated $76,000, should be rescinded.

Chances of Aerial Reserve Corps Badly Hurt

The prolonged delay in organizing the Aerial Reserve Corps authorized by President Wilson on July 13th, coupled with the discouraging effect of keeping one hundred National Guardsmen practically idle for close to three months at Mineola through the failure of the Aviation Section of the Army to supply training aeroplanes, has badly hurt the chances of the Aerial Reserve Corps. The only source of military aviators, above the number of Army aviators authorized, which is nominally one hundred, is the National Guard. Therefore, we again urge the rescinding of the order which limits the number of National Guardsmen to be trained to fifty, so that the number to be trained may be unlimited until a substantial air service has been organized.

When I consider that we have less than one hundred aviators trained and under training for our land defenses, I realize that this neglect in building up our aerial defenses would place our country at a terrible disadvantage in case of trouble.

Reports tell us that as many as fifty aeroplanes have been brought down on one of the battle fronts in France in one day. It is publicly known that half a dozen countries have between 2,000 and 9,000 aviators each. We ought to make every effort to get one thousand trained aviators as soon as possible. For this reason, we ask that the limit against the National Guard be removed.

Obstacles In Way of Progress Must be Removed.

As it is of utmost importance that all obstacles in the way of progress in the air service be removed, I consider it a duty to ask you to appoint a Committee to go over the whole subject. I take the liberty of suggesting that this committee consist of Army officers outside of the officers of the Aviation Section, following the method adopted by the British Government in investigating the administration of the Royal Flying Corps. The British Air Service benefited greatly by that investigation, and I feel that our air service will also benefit ultimately by such an investigation.

Messrs. Coffin and Wise Wood to Co-operate With Investigating Committee.

To co-operate with your committee, I will be glad to ask Messrs. Howard E. Coffin, member of the Naval Consulting Board, who, we understand, is in close touch with the Aviation Section of the Army in matters pertaining to aviation, and Mr. Henry A. Wise Wood, the President of the American Society of Aeronautic Engineers. As you know, both Mr. Coffin and Mr. Wise Wood are men of extensive experience, and have a nation-wide reputation for their ability in dealing with questions of national importance. Mr. Coffin's splendid work in standardizing and mobilizing our industrial resources, and Mr. Wise Wood's deep knowledge of the fundamentals which make for national welfare, leave no doubt that the assistance of these two gentlemen will be of value to your committee. They and your committee will have access to all the correspondence between the Aero Club of America and the War Department, the Governors and the National Guard of the different States, and the records and other data bearing upon the subject.

Having no ther interest in this matter than the upbuilding of our aerial resources, we would be glad if the conditions of our Aviation Section were better than they seem to be. We have never participated in any movement that was not constructive, and would not continue to urge the rescinding of the order which limits the training of the National Guard if we did not see clearly that it is a necessary step to get personnel for our air service.

Past Disagreements Show Aero Club Was Right—Aviation Section Wrong.

To further the movement to build up our aerial defenses, we have had at times to disagree, more or less strenuously, with the Aviation Section of the Army. I will cite herewith the most important instances:

(1) When Villa raided Columbus, and it was found that the Army had only six aeroplanes and twelve aviators available for service, the Aero Club of America offered to assist the Aviation Section by getting civilian aviators and aeroplanes. The answer that we received was that the Mexican trouble would not last long, and the Army had all the aeroplanes and aviators that it needed. We did not agree with this estimate of the situation, and events proved that we were right.

(2) The estimates presented to Congress only asked for an appropriation of $1,222,100 for aeronautics for the Army this year and $76,000 for training the National Guard in aviation. We considered this sum insufficient to meet our aeronautical needs, and submitted the case to the public and Congress. The fact that Congress increased the appropriation for aeronautics to $13,281,666, allowing $9,640,000 for training and equipping the National Guard, is evidence that we were right.

We have tried to be frank and to the point in our communications. Our letter of July 19th to President Wilson, in which the entire Administration was given credit for the provisions made for developing our air service is evidence of the sincerity of our efforts. I assure you that we wish that we could praise the Aviation Section for having arranged to train 500 Guardsmen, instead of having to appeal to have the order limiting the number of National Guardsmen to be trained to fifty rescinded. As a matter of fact, the action of the Aviation Section of the Army in not arranging for the training of National Guardsmen has caused the expenditure of a fairly round sum on our part, as well as many weeks of worry and hard work in trying to keep the National

Guardsmen interested until some provision could be made for their training. We have done these things without compensation or expection of compensation, because we considered it our duty to work for aerial preparedness to the limits of our resources.

Trusting that you will approve the request and will appoint a Committee to investigate the matter in the very near future, I remain

Yours very sincerely,
ALAN R. HAWLEY,
President, Aero Club of America.

Will Get a Thousand Aviators Yet

NOTWITHSTANDING the fact that the order limiting the number of National Guardsmen to be trained in aviation to fifty has not yet been rescinded, and that the Aerial Reserve Corps authorized by President Wilson last July has not yet been organized; and that the number of Army aviators is limited by law to less than one hundred—we daresay that this country will get a thousand aviators yet. The country is set on getting them and Congress, having provided for them, will see to it that action be taken.

The issuing of the order limiting the number of National Guardsmen to be trained at Army aviation schools to fifty, and the statement that Congress has allowed only $76,000 with which to train National Guardsmen are, of course, absurd. Congress has allowed $9,640,000 for the training of National Guardsmen and the organizing of twelve aero squadrons for the twelve Militia Divisions, and the National Guard can no more be prevented from getting the training and equipment due to it than they can be forced to go to hell because Major William Mitchell said that it should go there.

If the order limiting the training of National Guardsmen is not rescinded before Congress reconvenes, we can rest assured that it will be rescinded as soon as Congress convenes, and that Congress will see to it that an officer with the right attitude towards the National Guard is put in charge of the work of training National Guardsmen and organizing the Militia Squadrons.

As Mr. Alan R. Hawley pointed out in his letter to Secretary Baker, the National Guard, having been Federalized, can be as efficient as the Army cares to make it. As matters stand, it will no longer be possible for a prejudiced officer like Major Mitchell to keep hundreds of National Guardsmen idle for three months through lack of aeroplanes as was the case at Mineola, and prevent hundreds of other National Guardsmen from being trained in aviation because an officer of the Army Aviation Section thinks that the National Guard's place is in hell.

Aerial Reserve Corps Authorized by President Wilson Three Months Ago Not Yet Organized

It is unfortunate that the long delay in organizing the Aerial Reserve Corps, authorized by President Wilson on July 13, followed by Major Mitchell's shabby treatment of the National Guard, has disgusted the candidates who wanted to join the Aerial Reserve Corps. The hundreds of men who wanted to join the Aerial Reserve Corps during the summer months, and were in a position to give a couple of months to training, have gone back to their business and colleges, and while they may or may not feel the same way about joining the Aerial Reserve Corps at the present time, they have now gone back to their business and colleges, and will not be in a position to seriously think about the matter until the next vacations come along.

The regulations for the Aerial Reserve Corps have not yet been issued. Under the present provision, the men who join the Aerial Reserve Corps have practically the same obligations as they would have in the Federalized Militia, that is, they can be called out at any time and detailed for duty at the Mexican border or elsewhere. Many business men and college men cannot afford to leave their business or studies, although they would, of course, willingly do it in case of war. The idea that most people had was that if they joined the Aerial Reserve Corps, they could learn to fly and train under the direction of the Army, and only have two weeks of duty each year, excepting in case of war, or unless they were in a position to give more time. When they found that joining the Aerial Reserve Corps at the present time involves the possibility of their being taken away from their business and studies, they began to consider whether they could afford to join. It is hoped that Congress at its next session may so revise the Aerial Reserve Corps measure as to make it possible to train in the Aerial Reserve Corps men who shall only be called to duty in case of actual or threatened war.

This brings out the fact that there is a divided opinion regarding what the status of the Mexican situation is. If we consider the fact that it takes the bulk of our mobile troops to patrol the Mexican border, then we must be in a state of threatened hostilities which would make it possible for the Army to call on the Aerial Reserve Corps for duty at the Mexican border. On the other hand, the actions of the Aviation Section of the Army in limiting the number of National Guardsmen to be trained in aviation, its failure to supply the aeroplanes needed to train the hundred National Guardsmen at Mineola, and other such obstructive acts make it proper that that department, at least, does not consider this country as facing a state of threatened hostilities.

If the present state of affairs should continue, we would be lucky if we got 100 military aviators within a year; but there are better times coming, and we will get the thousand aviators yet.

Press of the United States Resumes Fight to Get Action on Building Up Our Aerial Defenses

The press of the United States is again taking up the campaign to get action on the building of our aerial defenses. For several months since Secretary Baker expressed his intention to make such changes in the staff of the Aviation Section of the Army as would insure getting a substantial air service in the shortest time possible, the press has been very generous in its forbearing attitude. But the facts concerning the antagonism against training National Guardsmen in aviation, and such absurd actions as advertising for prominent men in aeronautic circles to report to the Aviation Section have made the press realize that things are far from being well with the Aviation Section.

Those of us who are close to things know that the entire trouble has been caused by Major Mitchell. He has certainly succeeded in putting the Aviation Section of the Army in hot water—which is now reaching the boiling point.

The attitude of the press, like the attitude of the workers for aerial preparedness, is a very fair one. They only expect action with tangible results. They do not care how it is done, whether mistakes are made, but whereas the need is for one thousand aviators, and international conditions are getting more critical and serious daily, they expect a reasonable effort on the part of the Aviation Section to secure and train men in aviation. They condemn the Aviation Section because its antagonistic attitude has practically discouraged hundreds of National Guardsmen and civilians who were candidates for the air service.

Air Fighting

(Editorial Syracuse *Post Standard*)

THE development of aerial warfare, from the simple scouting expeditions at the beginning of the present style of combat by squadrons, the increase in size, power and fighting ability of battle planes, and the advance in military efficiency above ground are well described by Claude Grahame-White and Harry Harper in an English magazine article.

It gives us a clearer picture of what is being accomplished than we have been able to see through brief cabled reports.

There is, too, a prediction for the future, a prediction which it would be well to heed. They are agreed that:

We have been shown, in this war, what command of the sea means. And in any great war of the future, command of the air will be vital to our very existence. Aircraft in this war, the destructive machines, have given no more idea of the size, or of the power, of the fighting machines of the future than would a rowboat of an Atlantic liner. In the wars of the future it will be the great fighting aeroplanes, the machines for destroying hostile craft or for laying waste land positions, which will be to the forefront. Scouts, of course, will have their value, but instead of being all-important and doing the principal work, they will play their part merely in the general scheme, as do the sea scouts of the navy. Power in the air will be striking power, as it is on the sea or land * * * Any nation that falls behind in the srtuggle for air power may, in years to come, be defeated in a campaign lasting not a year or a month or even a week, but as the result of a blow delivered and completed within a few hours.

A speed of 200 miles an hour, or more, is predicted for the future aeroplane. It would thus be possible, upon a declaration of war, for a nation using a fleet of thousands of these weapons—less expensive than any other arm of the service—to strike suddenly the arteries and nerves of a nation unprepared to ward off an attack from the skies.

The development of the aeroplane as a fighting machine has come during the last two years. It was a weapon hitherto untried before August, 1914, and it was thought that the function of being eyes to the army was the sole advantage attached to the possession of large numbers of these machines. Later, following the period when they were devoted to scouting on a grand scale, they became invaluable as an aid in directing artillery fire, and in penetrating hostile country for a depth of hundreds of miles, and still later as actual destroyers, by means of aerial bombs, of redoubts, trenches and forts.

The American army needs aeroplanes and still more aeroplanes.

THE NEWS OF THE WEEK

Members of Volunteer Aerial Coast Patrol Unit Use the Sky as Road to Chapel

Neither Frederick Trubee Davison, H. P. Davison, Jr., sons of H. P. Davison of J. P. Morgan & Co., nor two friends of theirs missed chapel at Yale University yesterday morning, although they spent Saturday night and yesterday—except between 9 and 11 o'clock in the morning—at the Davison country place at Peacock Point, Glen Cove, L. I.

They didn't use seven league boots either. After breakfast they just naturally wandered down to the Davison dock, conveniently adjoining the Davison cottage, and climbed into three hydro-aeroplanes hitched there.

They shot into the air about 9 o'clock and skimmed off in the general direction of New Haven. They arrived there in less than forty-five minutes, in plenty of time for chapel, which they reached by the trolley and shoe leather route from the boat club.

There they listened to a sermon by Prof. William Lloyd Phelps, secure in the knowledge that no proctor could have marked them down for a chapel cut.

After the sermon they returned to the boat club, got into their hydro-aeroplanes and took a three-quarter of an hour hop, skip and jump back to Peacock Point. They had hardly been missed there.

Wichita Aero Club Meet Postponed

The aviation races, with $20,000 in prizes, which were being arranged for October 25 to 27, by the Wichita Aero Club, have been postponed until the spring on account of insufficient time to arrange the details for the meet.

Sperry Flies from Amityville to Boston

A hydroaeroplane flight from Amityville, L. I., to Boston, a distance of approximately 250 miles, was made October 1-2 by Captain Leo A. Dewey, U. S. A., and Lawrence B. Sperry.

A gale forced the aviators to land on the ocean. They were rescued by a Coast Guard crew and continued their trip, passing over Forts Rodman and Adams. Following the shore line, they flew over the northerly side of the Cape Cod Canal, rounded Minot's Light and passed over Boston Harbor to the navy yard.

The route and progress of the machine were checked by signals dropped by Captain Dewey and radio messages to the forts along the line of flight.

Macy Stabilizer Demonstrated to Authorities

Representatives of the Army, Navy, and Aero Club of America tested the Macy Stabilizer during the past week and found it to be a most remarkable instrument. Lieut. Carberry of the Army, piloted the Martin machine, equipped with the stabilizer in one flight and found it efficient. Naval Constructor H. C. Richardson, U. S. Navy, flew as a passenger and was pleased with the instrument.

Messrs. Alan R. Hawley, president, and Henry Woodhouse, member of the Board of Governors of the Aero Club of America, part of the club's committee which attended the demonstration at the invitation of Mr. John A. Wilson, cousin of President Wilson, also flew and were greatly impressed with the remarkable instrument. The tests took place at the Wright Flying Field at Mineola, L. I., last Saturday. Mr. Macy had his stabilizer mounted on a Martin Military Biplane, similar in every respect to the military biplanes used by the Army. On the arrival of the committee and a number of the invited guests, Sargent W. C. Ocher the pilot, who has leave of absence for three months, started from the ground and made a demonstration flight in which the aeroplane performed all the manoeuvers under the control of the Macy Stabilizer. It controlled the machine perfectly in climbs, when the pilot had his hands off the controls, and banked at a perfect angle, flying very steadily.

After landing in one of the flights, the covers were taken off the device, and Lieut. Carberry, appointed as representative of the Army, and Naval Constructor Richardson, representing the Navy, examined the device very thoroughly, after which both these officers were given a flying demonstration, with which they seemed very much pleased.

President Alan R. Hawley, of the Aero Club of America, and Mr. Henry Woodhouse made demonstration flights. They both expressed great interest in the manner in which the machine flew under the control of the Macy stabilizer, which absolutely controls the lateral flight of the aeroplane and appears to be fool proof. Only the man at the controls can tell just how well it controls horizontally—therefore on that day only Lieut. Carberry could state to that effect.

There was a large crowd of interested persons at the field to see the demonstration, among whom were Capt. Ernest C. Bass, of New York; Augustus Post, member of the Aero Club of America; Harold F. Kantner, just returned from instructing officers in the Italian navy in aviation, and Mr. Charles Vought, of the Wright Company.

The Macy Stabilizer has been demonstrated at the Pacific Coast in the past two years, and it is said that De Lloyd Thompson remarked that with it he would consider it safe to climb out of the seat and out on the fusilage of the plane.

The smallness and simplicity of the instrument are especially noteworthy.

John A. Wilson, a cousin of President Wilson, is the man behind the inventor in his efforts to put his stabilizer on the market. He with Congressman O. D. Blakeley and C. H. Sheasley of Franklin, Pa., and William Muir of Titusville, Pa., have financed Mr. Macy's work and expect to put the invention before the public and to have the United States adopt it for all military aeroplanes.

The Glenn L. Martin military tractor in which the Macy stabilizer was tested, as described above. Mr. Macy is shown at the wheel.

Miss Helen Hodge, of San Francisco, well known society girl, who is an aviation enthusiast, and who is taking a course of tuition at the Christofferson Aviation School.

Wireless Telephone for Aeroplane Being Tested.

A wireless telephone for aeroplanes is being tested by the army aviators at Mineola. It can be used both as a telephone and wireless telegraph, a small switch in front of the driver's seat making it possible for the operator to use the instrument either way.

S. A. E. Aeronautic Engine Division Meeting

A meeting of the Aeronautic Engine Division of the S. A. E. was held September 15 at Washington. The mountings of propeller-hubs was the main subject considered. It was finally decided that the Division is not ready to recommend a complete propeller-hub. It will recommend a standard shaft-end like that used in the French standard hub.

The proper size of propeller-hubs was discussed, one member suggesting that there should be a sufficient number that the torque range of each size should be only 40 per cent of its minimum torque. It was voted that there should be two standard sizes for engines under 200 h.p. A sub-division was appointed consisting of Messrs. Crane, Griffith and Heath to prepare drawings for the two sizes of hubs to be recommended.

The meeting considered a number of propeller-hub designs submitted by various manufacturers. The general opinion seemed to be that while a taper and key mounting should be adopted for the present it might be possible to develop a more satisfactory mounting for future use.

A number of replies had been received from manufacturers of spark-plugs and engines showing their opinions on the relative merits of spark-plugs having ⅞-18 thread (S. A. E. standard shell) and those having 18 mm. thread. The spark-plug manufacturers having the most experience with aeronautic-engine work favored the 18 mm. threads, and it was voted that such a plug be adopted for areoplane engines.

A summary was read of the various suggestions regarding a standard list of units to be included in giving weight of engines. The sense of the meeting was that the weights of the following items should be listed separately:

1. Engine, including water and oil-pump, integral water connections and reduction gear (if used), inlet manifold, standard propeller-hub with flanges and bolts. 2. Carbureter —number and type. 3. Single magneto ignition system—including spark-plugs and connections. 4. Double magneto ignition system—including spark-plugs and connections. 5. Auxiliary starting magneto and and connections. 6. Complete battery ignition system. 7. Exhaust pipe flanges. 8. Exhaust pipes and muffler. 9. Air pump. 10. Gasoline pump. 11. Electric starting motor. 12. Electric generator. 13. Storage battery. 14. Starting switchboard, with necessary instruments. 15. Electric tachometer magneto. 16. Mechanical tachometer attachment. 17. Hand starting crank. 18. Complete air starting system, including air reservoir. 19. Radiator ond connections. 20. Auxiliary oil reservoir and cooling radiator. 21. Tool kit. 22. Propeller. 23. Gasoline consumption (lb. per h.p. hour). 24. Oil consumption (lb. per h.p. hour). 25. Initial capacity of engine oil reservoir (gal., lb.). 26. Cooling water.

The following members of the Division were present: Henry Souther, chairman; H. M. Crane, F. S. Duesenberg, L. M. Griffith, C. B. Kirkham (representing C. M. Manly), A. F. Milbrath, Coker F. Clarkson, ex-officio, and A. C. Woodbury, Recorder. The following were present by invitation: Capt. V. E. Clark, H. C. Dickinson, Radford Pitt, Dr. S. W. Stratton and Raymond Ware.

National Advisory Committee for Aeronautics Meets

The annual meeting of the National Advisory Committee for Aeronautics was held in the offices of the committee in the Munsey Building, October 5th. The following members were present: Prof. W. F. Durand; Captain Mark L. Bristol, U. S. N.; Dr. Charles D. Walcott; Prof. John F. Hayford; Dr. S. W. Stratton;; Prof. Charles E. Marvin; Lieut Col. Geo. O. Squier, U. S. A.; and Naval Constructor H. C. Richardson, U. S. N. The committee considered the work that had been accomplished during the past year, and inaugurated a program of work for next year.

Hon. Otto Praeger, Second Assistant Postmaster General, attended the meeting and informed the committee of the efforts of the Post Office Department to inaugurate an aerial postal service, and of the difficulties encountered. As a result of this visit it appears that the Advisory Committee can be of considerable assistance in attacking the problem, and subcommittees of the Post Office Department and the National Advisory Committee for Aeronautics will at once proceed to take up the matter.

One of the most important objects accomplished by the committee during the past year has been the development of

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The Burgess seaplane which was used to locate Lawrence B. Sperry when he was forced to descend at night on his New York-Boston flight.

To Train Field Officers to Fly

A class in aviation for training field officers, including those with the ranks of major, lieutenant-colonel and colonel, will be established at North Island shortly, according to an order issued by the War Department.

It is not intended that these officers shall become active aviators, but the course will be for the purpose of familiarizing them with the character of training required and the tactical use of aeroplanes.

Army and Navy Orders

First Lt. Lelos C. Emmons, 37th Inf., to Ft. Sam Houston, for examination for detail in aviation section, Sig. Corps.

First Lt. Patrick Frissell, 11th Inf., attached aviation section Sig. Corps as aviation student, to Sig. Corps Aviation School, San Diego.

First Lt. Harry M. Brown, 22d Inf., attached aviation section of Sig. Corps as aviation student, to Sig. Corps Aviation School, San Diego.

First Lt. John N. Reynolds, C. A., attached aviation section Sig. Corps as aviation student, to Sig. Corps Aviation School, San Diego.

MOBILIZING OUR AVIATORS?

The following list, which is continued from the last number of Aerial Age, is published at the request of the Aviation Section of the Army contained in the following letter bearing the signature of Col. Squier and the initials of Major William Mitchell:

> *"There is enclosed herewith a list of names of persons who it is understood have flown heavier-than-air machines in the United States. The addresses of few of these persons are known. Can you, through your journal or otherwise, make this list public, and, at the same time, ask those enumerated to communicate with the officer in charge of the Aviation Section, Signal Corps, War Department, Washington, D. C.? Their letters should state, (a) nationality, (b) age, (c) type of aeroplane and control they have flown, and (d) whether or not they desire service with the United States Army."*

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Machines and hangars of the U. S. Army at the Wright Flying Field, Mineola, Long Island.

REPORT OF NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

What the Army and Navy Want—Prominent Engineers Discuss Power-Plants—Bright Outlook for Standardizing

Much helpful data and food for thought can be found in the following report of the public session of the Executive Committee of the National Advisory Committee for Aeronautics, held at the Smithsonian Institution, June 6, 1916, just issued, which AERIAL AGE publishes in full.

It is a most healthy discussion throughout, and it is hoped that these meeetings will take place often and will be well attended.

THE CHAIRMAN. Gentlemen: You know the National Advisory Committee for Aeronautics was appointed a year ago and has taken up a number of the problems of aeronautics and, I think, made certain progress. The First Annual Report has been issued. At a recent meeting of the committee, it was stated through the press and also the statements of men who should know about these matters, that here is no a good American motor made; that things are very uncertain about aeronautics, and that we should learn from Europe; in fact, that we are almost ignorant of what aviation means.

The question undoubtedly is a very serious one. At our last meeting the committee decided to ask representatives of manufacturers of aircraft and motors used in aircraft to come and have an informal discussion, as we wish to get first-hand information, if possible. So, you were invited to come.

It so happens that we are holding a meeting in these rooms, right here where Dr. Langley first developed his idea of the physics of the air and also of aircraft. Over on the wall, there, is a representation of the first heavier-than-air machine known to be in flight. We have here the one Mr. Manly worked on for so many years—the man carrying machine is seen flying over Lake Keuka. It is interesting to hold this first really large conference meeting at this place.

I will now invite a general statement in regard to aeronautic motors from Mr. Henry Souther, who has been appointed consulting engineer of the Army in connection with military aeronautics, and I would like to ask him if he will kindly make a statement from his point of view.

STATEMENT BY MR. HENRY SOUTHER, CONSULTING ENGINEER, WAR DEPARTMENT.

MR. SOUTHER. Mr. Chairman and gentlemen: It is with a good deal of diffidence that I attempt to size up the situation in the face of men, manufacturers and engineers, who have been so close to aviation for so long. I did know Dr. Langley at the time of his experiments, however, and he did consult me in the old days as to the strength of materials used.

During the last month, since I have been on duty with the Signal Corps, in connection with aviation motors, I have learned a great deal. To put it briefly, I am very much encouraged by what I have learned. It seems to me that any statement made that we are entirely ignorant, or hopeless, in the matter of motors for aviation is entirely wrong. As I look back on the early endeavors with motors cars—say in 1900—I see things that make the present aviation motor, in this country, look very good. That motors 100 per cent efficient exist in this country today for aviation purposes, no one will claim. There is no doubt about that. But I do think we are in a fair way to obtain a satisfactory motor and within a reasonable length of time.

There is only one way of arriving at anything of this nature, and that is by a slow process of evolution or use. If the motor car in 1900 had been made in quantities compared with aeroplanes today, it would not have developed very fast. It was only by the building and use of many of them, and continued use of imperfect motors in the hands of the public, the final judge, that we have gotten where we are.

Now, say fifteen years later, we have a large accumulation of knowledge; and I see no reason why progress should not be very much more rapid with aviation motors than it was with motor car motors. It all comes down to the question of use and experience. We must use motors to develop them. The knowledge gained will be of exceeding value. We must all watch every detail of experience through actual use. It is only by lessons learned through failures and experience that progress is made. Consequently, every failure and every experience must be brought to our notice first-hand. That is the one great aid we all must have, whether we be manufacturers or users. We must insist that every failure be brought to the attention of competent men for judgment as to the real cause of failure.

Empirical knowledge and science must combine. Science alone will not produce the perfect aeronautics motor.

To arrive at the fundamentals of the problem, which are so well stated in the report on motive power from the National Advisory Committee, I believe that extremes need not be resorted to. I can not believed that we will arrive at success in aviation motors by any extreme methods, any more than we have with any other motor.

At the outset, with motor car motors, all strove for extreme lightness. It was attained, and also the breakages that went along with it. Slowly we have worked away from that thought—extreme lightness—and have come to something entirely normal. We will attain the same end through similar evolution in aviation motors. It does not seem to be humanly possible, no matter what the extent of knowledge and experience in another art may be, to design and build the ultimate aviation motor at once. Consequently, failures must be anticipated.

One of the qualities demanded is stated as being reliability. There can be no argument about that. That quality can be attained, not by what may be called freakish methods, or by invention, but by sound engineering. Reliability does not necessarily mean anything unusually strong, as a crank shaft, or an unusually strong motor as a whole. It means reliable wiring, for one thing, and all other such details.

In a recent visit to a flying camp I saw some every good illustrations of what not to do. I saw wiring of a careless nature in the planes used. In this state of the art, there is no excuse for such wiring. I am not saying this in harsh criticism, but to make the point. Defective wiring is as dangerous as a broken crank shaft.

Danger of accident may come from an accumulation of gasoline in the shape of a puddle somewhere in the structure. A back fire is not usually dangerous, unless there is a volume of gasoline present, to catch on fire and keep on burning. An oil pan full of gasoline will burn up a motor car; a similar condition must be more dangerous in an aeroplane. The character of gasoline piping is, therefore, just as important as anything. It must not vibrate, with danger of falling apart. If it does, there is a catastrophe. It must not chafe, with resulting leaks.

The question of oiling, I believe is well handled now. It seems that we have several examples of thoroughly good oiling systems.

Dependability develops along the same lines as reliability. Durability is the quality that must evolve with experience. We will learn by experience what wears out in an aeroplane motor. We have learned what wears out in motor cars, and we must learn it in an aeroplane by experience. I can see no short road.

The quality of simplicity is certainly exceedingly important. The development of the motor car art has clearly demonstrated that simplicity wins. Complication is a very serious handicap to a motor car. All should insist on absolute simplicity in the full meaning of the term.

Adaptability! There is a quality which will change as fast as the art changes. What is considered adaptable today, ten years hence may be considered quite bad practice. But, at the same time, we can only do now what is possible today with our present knowledge.

Availability of materials of manufacture: The quality of materials will evolve, as in any other art—the best material for one purpose may be the worst material for another purpose. We must find what is best for every operating part of an aeronautic motor. It will be done slowly.

We have much knowledge to start with, and I should say the problems would not be materially different from those in the motor car. In the motor car, in 1900, for example, the manufacturers of materials had not been educated to furnish unusual materials. Neither had the user of them been educated to insist on unusual materials. Steel is a very good illustration. It was a very common thing in 1900 to be confronted by a manufacturer with the statement, "We want no alloy steel; we want no heat treatment. We want good wrought iron." The manufacturers absolutely adhered to that sort of statement. At present there is no such feeling among the manufacturers of motors for motor cars, or any other high grade machinery. The progress made in the quality of materials used in the last fifteen years has been the most rapid development in the art. We ought to have no trouble in getting proper materials. Our problem will be to select the proper material for any given purpose.

It is just as foolish to take high grade steel for a drip pan, or other non-vital part, as it would be to take a cheap material for a ball bearing. Somewhere in between two extremes is the right selection and I know we will soon discover it. I anticipate no trouble in getting the right materials for an aeroplane engine.

The difficulties met in connection with the use of the motors of today is probably the most interesting consideration for all. We must know what the difficulties are in order to meet them and overcome them, and the quicker we organize to get together the failures—whether they be of design, construction or material—and to find out the real causes, the better for the art.

One of the Army fliers came from Mexico recently after much difficult flying. I was very keen, indeed, to know from him first-hand what motor troubles he had had, and I questioned him on the subject. I asked him the direct question as to what predominated in his mind as the most serious motor failure that he had experienced in actual service. He thought it over very carefully, and stated that the dominant failure was the magneto failure. We have all believed that magnetos were about right. I believe that later developments will show that it was not the magneto itself that was at fault, particularly the electrical or mechanical parts of it, but rather the method by which it was attached to the motor and driven. The magneto was called upon to bear shocks by unfortunate mounting or drive that were unnecessary. That is a thing which should be avoided.

I then asked him as to the other ordinary motor troubles, particaularly the sooting of plugs, due to over-oiling or bad mixtures. He immediately stated that inasmuch as they changed plugs after every long flight, he had no trouble of that kind. That was very gratifying.

I questioned him on the matter of whether he was getting cylinders scored or cut, or piston rings broken, indicating bad lubrication of an over-heated engine, or something of that kind. He stated positively not. He referred not only to service flying, but also to flying at the San Diego Aviation School.

So, there are at least some motor diseases that we all know very well that are not predominant. He flew only a relatively low horsepower machine—in the neighborhood of 90.

The 160 horsepower motors that are now on duty had just been received and had just been assembled when he left the Mexican border, so he knew nothing of them. Motor difficulties, peculiar to aviation will arise. Some old difficulties seem to have gone forever.

(*To be continued*)

S. A. E. Council Meets

The September meeting of the S. A. E. Council was held at the office of the society on the 12th and 13th of the month. The following attended: President Russell Huff, First Vice-President, E. S. Foljambe, Councillors George W. Dunham, David Bucroft, and Wm. P. Kennedy, Treasurer, Herbert Chase and Secretary Coker F. Clarkson.

The Council considered the list of subjects before the Standards Committee and recommended that the following, some of which have been worked on by the Divisions, be assigned: To the Aeronautic Engine Division, spark-plug size, propeller-hub dimensions, propeller-hub locking fitting, engine supports, specifications of engine-weight, direction of engine rotation and stresses in propellers.

The following subjects have been submitted for consideration: To the Aeronautic Engine Division, proportions of crankshafts, spark plug porcelains and pipe fittings for aeroplanes.

THE TIMES' CHICAGO-NEW YORK FLIGHT

FROM Chicago to New York between sunrise and sunset! Victor Carlstrom, already the holder of many records for long-distance aeroplane flights, is making preparations for a sunrise-to-sunset non-stop flight from Chicago to New York for the New York *Times*. Carlstrom will make his trip in the very near future. He will fly alone and will carry with him limited mail which will be posted in Chicago in the morning and delivered to the addresses in New York on the evening of the same day if all goes well. This follows upon the action of the Post Office Department in availing itself of the opportunity represented by *The Times* to use the flight as an experimental aeroplane mail route from Chicago to New York.

If Carlstrom succeeds in his attempt he will have established the record for long distance non-stop flight in the United States, and a world's record for long distance flight without a stop across country, for the trip between the two cities by the route which he has chosen will be something more than 900 miles. Moreover, he is making the venture without relying on the following of a line of railroad, a river, or some other easily visible landmark for his guidance, as has been the case in most long distance air trips heretofore in this country.

If he succeeds in the flight from Chicago he will probably break all records for distance covered, with the exception of that made by W. Landmann at Berlin on June 26, 1914. Landmann flew for 21 hours, 48 minutes and 15 seconds around a closed circuit and covered a greater distance than Carlstrom's route from Chicago to New York, but there were no difficulties in his way. What is probably the longest cross-country flight on record was made last summer by a French officer whose name was not given out. He started from the French lines on the western front, flew over Berlin, and then started for the Russian lines in Volhynia, but was compelled to descend at Cholm, about fifty miles short, on account of lack of fuel and was captured by the Germans. This was a distance of about 850 miles presumably covered without any stops, but the Chicago-New York route is considerably longer.

Carlstrom will use a Model R. Curtiss tractor with special auxiliary gasoline tanks.

The normal fuel capacity of this about ninety gallons, has been increased to 165 gallons. Additional panels have been added to the planes so that a wing spread which reaches forty-eight feet in the army planes is sixty feet in Carlstrom's machine. It is not certain, however, that this feature will be retained. It adds considerably to the lifting capacity and was added to the machine when it was expected that it would be used for an attempt at a time when record with five passengers was interrupted. Experiment may prove that it will be needless for the purposes of *The Times* flight.

Those interested in aeronautics throughout the country commended *The Times* for their undertaking. Carlstrom is confidently looked upon to succeed. He has had a great amount of cross-country experience.

Carlstrom's most recent flight was on Aug. 25, at Newport News, when he flew the Curtiss twin-motor military biplane, 641 miles in eight hours and forty minutes. Previous to that he flew a machine of the same type from Newport News to Sheepshead Bay. On May 24, with Alan R. Hawley as passenger, he flew from Sheepshead Bay to Washington, a distance of 237 miles, which he completed in 187 minutes. His first great long-distance flight was on November 26, 1915, when he flew, with one stop for gasoline, from Toronto to this city. He traveled about 600 miles on this occasion and completed the trip after being 400 minutes in the air.

Carlstrom was born in Gustaf Fahn Lan, Sweden, and is twenty-six years old. He is an American citizen and received his pilot's license in 1912, after taking his tests at Dominguez Field, near Los Angeles, Cal.

THE AVIATION CAMP ON MYSTERY ISLAND

By Godfrey L. Cabot

THE Aviation Camp on Mystery Island, Salem Harbor, Mass., was a great success, and marks an historical event in the military history of the state, being the first Aviation Camp ever held in the State of Massachusetts by the State Militia, or any other military organization.

There were no severe storms, and the weather on the whole was very beautiful. There was flying almost every day, and at least one Burgess-Dunne seaplane was in commission every day, and sometimes two.

Lieutenant John Balch Blood, of Newburyport, and Lieutenant Chester L. Dane, Lieutenant Greeley Curtis, Doctor Mathes, and Ensign Norman W. Cabot, and Ensign Norman E. Merrill were officers present.

Location was on high ground with a beautiful view down Salem Harbor in one direction, and out towards Howes Island in the other. Close at hand was a hangar belonging to Ensign Godfrey L. Cabot and his seaplane, which was used every day that there was flying. Mr. Godfrey L. Cabot himself broke his wrist the first day of camp and was thus unable to do any flying, except as a passenger, in the new tractor biplane, which is being given in the name of the Aero Club of New England to the Massachusetts Volunteer Militia. This new tractor biplane has a Curtiss OXX new style model 2 engine, and standard Dep. control; is equipped with suitable instruments, and flies over seventy miles an hour, and climbs over 200 feet a minute, which is certainly doing very well for a 100-h.p. engine. It rises very easily from the water, and bids fair to be very satisfactory for the purpose of teaching the Newburyport fliers.

Ensign Norman E. Merrill is practicing on this machine under the tuition of Mr. Doherty, one of the professional aviators employed by the Burgess Company, who has formerly trained many military aviators in Europe, and is certainly a wonderfully skilful flier and an excellent instructor.

Mr. Richmond Fearing flew to a height of nearly 7,000 feet in Mr. Godfrey L. Cabot's seaplane, under the tuition of Mr. Clifford Webster, one day when it was too windy for landing practice.

There were about thirty-four or thirty-five officers and men at the camp, and a great many visitors came to see them.

It is believed that before the end of the year there will be five machines in commission along the North Shore for military practice, and that next year there will be an Aviation Camp on a larger scale, with still more interesting results.

The tractor biplane will be delivered to Newburyport as soon as Ensign Merrill, who has a license for flying the Curtiss control, has made himself sufficiently familiar with the Dep. control.

THE TWELVE-CYLINDER CURTISS 250 H. P. MOTOR

THE Curtiss Aeroplane Company has recently built a twelve-cylinder 5" x 7" motor. As this engine weighs but 3½ pounds per horsepower and develops 300-h.p. at 1,400 revolutions per minute, it would appear that some remarkable speed records might be forthcoming in the near future.

The accompanying views give a clear idea of the compactness of this motor, the extreme over-all length being 80". The characteristic feature, seen in the view from bottom of crankcase, is the very large, counter-balanced crankshaft, having a bearing between each crank. The crank pins are 2½" diameter and the main journals of 2¾" diameter. The bearing caps not only show 8 bolts to each one but are steel-keyed into the crankcase to prevent any lateral movement. Also individual forced lubrication enters through the bottom of each cap where the load is greatest on the bearings. A large annular thrust and radial ball bearing are contained in the housing shown at the left end of the illustration.

In the view looking down upon the motor can be seen the two separate twelve-cylinder Dixie magnetos furnishing double ignition with the consequent reduction of the chances of mis-firing. Two Duplex Zenith carburetors are used. The compactness of this motor, developing as it does 300 horsepower, is well shown here.

Also this view shows up a generous sump holding oil for eight hours' normal running and also indicates method of mounting this engine. The seven steel tubes giving this support are pressed clear through the crankcase and, therefore, receive all the strain of the mounting. The little white pull-handle, seen just over the right-hand magneto, is one of two which opens the exhaust valves about ⅛ of an inch to relieve compression while cranking. This also permits gasoline to enter the cylinders when priming through a hole in each exhaust pipe.

By pulling out one of these handles, the motor can be cranked with no more effort than is required with a six-cylinder engine of the same bore and stroke or an ordinary powerful automobile motor. Installation of self-starters is readily possible with this type engine.

General Description

Type of Motor—12 cylinder water-cooled Vee type. Separate cylinders.

Horsepower—Rated 250 H. P.

Motor Speed—1,400 R. P. M. normal; 1,500 R. P. M. maximum; 200 R. P. M. minimum.

Bore and Stroke—5 x 7.

Weights—Motor, 1,125 lbs.; radiator, 120 lbs.; cooling water, 100 lbs.; propeller, 95 lbs.

Gasoline Consumption per Horsepower Hour—6/10 lbs.

Oil Consumption per Hour at Maximum Speed—2 pts.

Installation Dimensions—Overall length, 84⅝ in.; overall width, 34⅛ in.; overall depth, 40 in.; width at bed, 30½ in.; height from bed, 21⅛ in.; depth from bed, 18½ in.

Equipment—Magneto, carburetor, exhaust, manifold, radiator, propeller, tachometer complete, self starter, tools, shipping box.

Details of Motor

Ignition—2 high tension 12 cylinder magnetos located on front of crankcase cover and driven off timing gears through new wear-saving flexible drive. Leather boot on magnetos. Rubber covers on spark plugs.

Carburetors—Four "Zenith." Each intake supplies one set of 3 cylinders through separate cast aluminum manifolds. Hot air intakes to carburetor through stoves around exhaust pipes. Auxiliary air intake in manifolds with hand control. Carburetor located between cylinders inside V.

Lubrication—Pressure feed. The oil is forced from reservoir in bottom of crankcase by gear-pump to one end of hollow camshaft, through camshaft to timing gears and all camshaft bearings and is carried to main bearings by separate pipe and through crankshaft throws to connecting-rod bearings and from connecting-rod through tubes on connecting-rods to piston pins. Return oil is pumped out of the splash-pan into reservoir, so lubrication is not affected by the inclining of the motor.

Water Circulation—Centrifugal pump bolted to front end of crankcase cover and driven through spiral gears mounted on ball bearing shaft.

Cylinders—Made of high carbon steel drop-forging machined all over. Monel metal side wall brazed on. Outside of cylinder heavily nickel plated to prevent rust. Cylinders bolted to crankcase by 12 bolts.

Valves—Poppet type in head. Intake nickel steel. Exhaust tungsten steel.

Valve Springs—(Coil Type Intake.) (Offset Type Exhaust.)

Valve Gages—Valves seat direct in cylinder head.

Rocker Arms—Drop forgings case-hardened and nickel-plated.

Cam Followers—Plunger type open-hearth steel, case-hardened.

Cam Follower Guides—Manganese bronze. Bolted to case by two studs.

Camshaft—Open hearth steel drilled hollow, cams integral 7 bearings, cams case-hardened, bearings and cams ground.

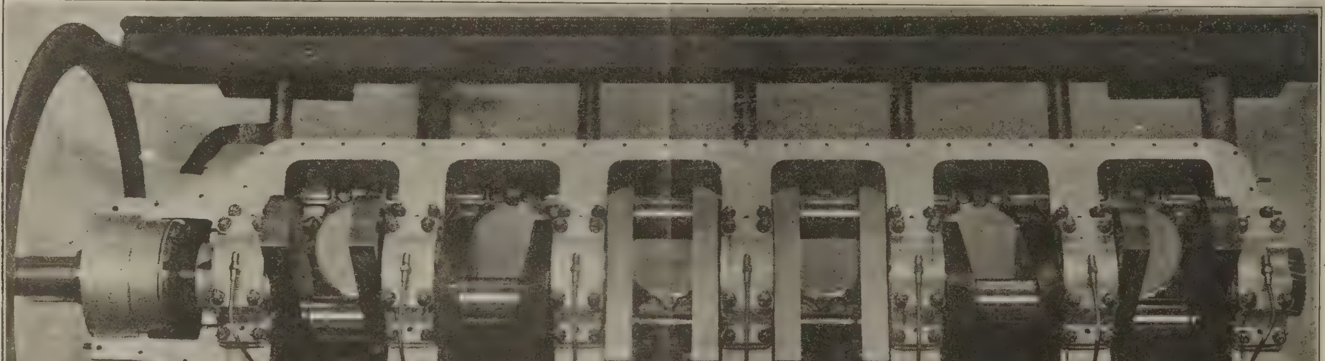
Camshaft Bearings—Aluminum alloy castings. Split type bolted together and held in crankcase by locked set screw.

Pistons—Aluminum alloy die castings. Two cast-iron eccentric rings.

Piston Pins—Nickel steel heat treated. Drilled hollow, case-hardened and ground. Pin bearings direct on aluminum of piston bosses. Pins pressed in connecting rods and held by locked set screw.

Connecting Rods—Of the forked type made from Chrome Vanadium steel forgings machined all over. Eye-beam machined cut from the solid.

Connecting Rod Bearings—Fahrig white metal, bronze backed. Reamed to running clearance of exact size of



Crank case and crankshaft of new Curtiss "Twelve."

crankshaft. Bearing held in fork rod and rotating in single end rod.

Crankshaft—Heat-treated Chrome Vanadium forging, finished all over and drilled hollow. Six throw, seven main bearings. All bearings ground. End of shaft splined, tapered and threaded for propeller hub. Size of shaft 2½ inches, on crankpins, 2¾ on main bearings.

Crankshaft Bearings—Fahrig white metal bronze backed. Reamed to exact size of crankshaft. Caps aluminum. All caps held on with 4 large bolts.

Propeller Bearings—Large annular and thrust ball-bearing mounted in extended end of crankcase.

Crankcase—Aluminum alloy casting. Seven motor support tubes, lower half bolted on.

Timing Gears—Helical teeth type. Crankshaft gear steel forging pressed in and keyed to shaft. Half time gear special Manganese bronze, keyed on camshaft and held with retaining nut locked to gear.

Magneto Driver—Steel bevel gear driven off separate shaft on gear case cover, mounted on ball bearings. Flexible coupling between magneto shaft and drive shaft.

Water Pump—Centrifugal type. Cast aluminum housing and impellor.

Tachometer Drive—Shaft gearing in aluminum housing bolted on face of timing gear housing and driven in conjunction with pressure air pump through universal drive direct off half time gearing.

Exhaust Pipe—Steel tubes bolted to exhaust ports.

Water Piping—Brass tubing, nickel plated. Rubber hose connections with special clamps. All cylinder nipples and connections brazed and nickel-plated.

Raditor—Special honeycomb type sufficient for cooling under any conditions.

Propeller—Standard Curtiss; unusual efficiency.

Bolts, Nuts, Etc.—All nuts are cotter pinned and nickel-plated.

Aluminum Castings Co. in Shape for Aeronautical Business

The Aluminum Castings Co., of Cleveland, whose aluminum product, Lynite, has been used so extensively in the automobile field by some of the largest automobile makers in the country, has entered the aero-engine field and it would seem that their product will be widely used in the very near future.

It would seem that the Lynite motor for use in aeroplane work would be particularly desirable on account of its lightness, and quite a number of aeroplane companies in the country are already experimenting with this type of construction. In addition to this, the Aluminum Castings Co. has supplied large quantities of castings, such as crank cases, oil pens and transmission cases, which are largely used by automobile manufacturers. They hope to duplicate this service in the aeronautical field.

With plants located in Cleveland, Detroit, Buffalo and Fairfield, Conn., this company is in a position to render the most efficient delivery service.

Eaton Hydroaeroplane to be Tested

A large twin-motor hydroaeroplane constructed by the New York Aero Construction Co. will be tested during the next week. The machine has a wing spread of 73 feet and a lifting capacity of 4,600 pounds. It is designed to carry two men with a rapid fire gun each and a pilot in control of the machine. Two ninety-horsepower Aeromarine engines are used.

A preliminary test was made on September 30th, when through a slight mishap the machine was overturned, causing slight damage to the wings.

Warren S. Eaton, the designer of the craft, who formerly was on the engineer's staff of the Glenn L. Martin Co., of Los Angeles, has very strong hopes for the success of his newest product.

A New Aviation School at Stratford, Conn.

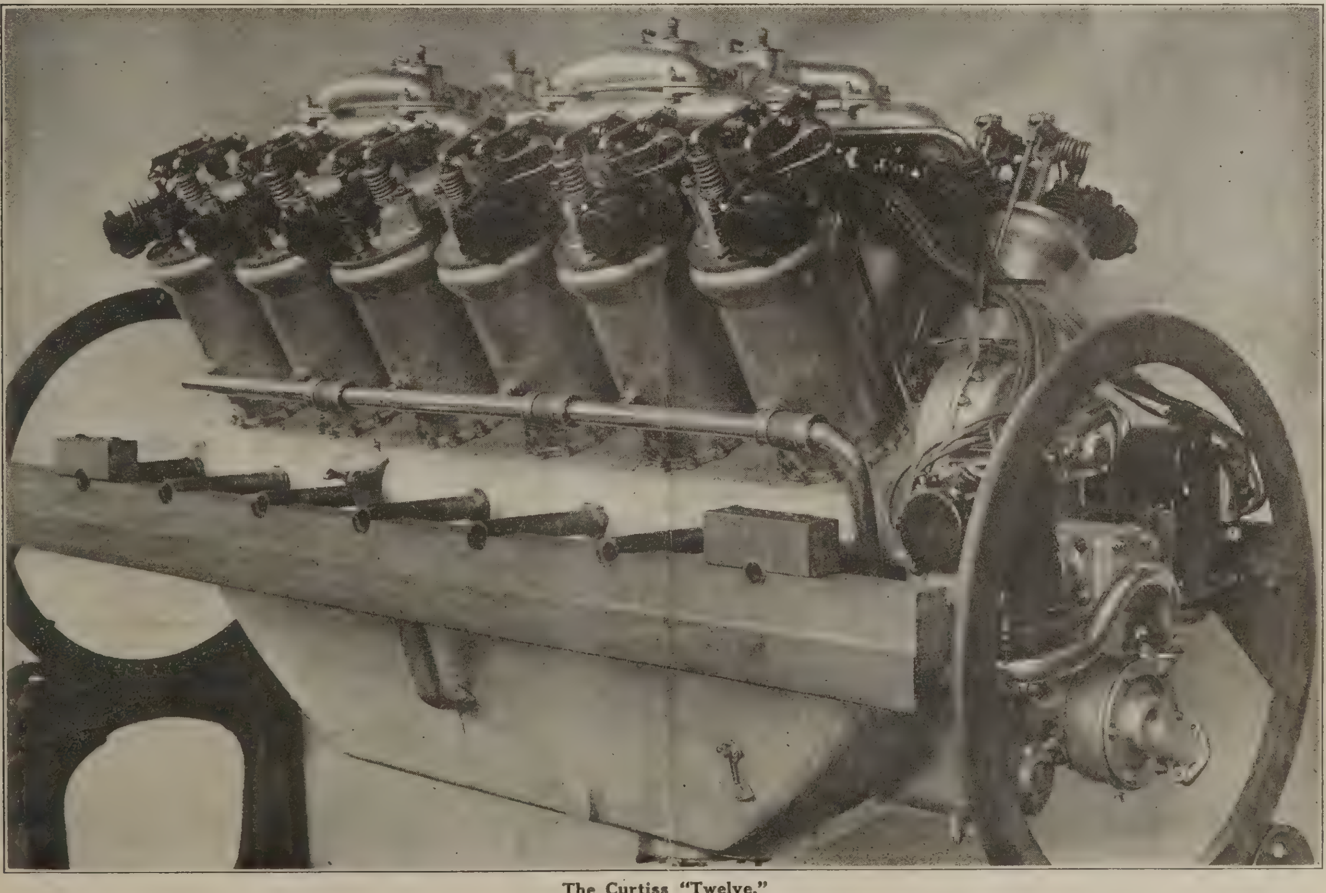
The Scientific Aeroplane Co. is preparing to start an aviation school at Stratford, Conn., where Mrs. Alys McKay Bryant will have charge of instruction.

Balloon Races Sanctioned

In a telegram received by the Aero Club of America, Mr. A. B. Lambert states that sanction has been granted for the holding of the National Balloon Race. There are already five entries—Messrs. Honeywell, Custer, Assman, Berry, and Cole. Mr. Lambert states that the money prizes and expenses have been deposited in the bank and that the gas capacity greatly exceeds requirements.

F. W. Zimmer Flies from Port Huron to Detroit

On September 29th Mr. F. W. Zimmer, who has been at Port Huron for the past month instructing Mr. R. W. Judson, flew from Port Huron to Detroit in the face of a strong southwest wind. Mr. Zimmer carried a passenger and made the flight without hitch.



The Curtiss "Twelve."

FOREIGN NEWS

FRANCE

Jean Navarre, former premier French aviator, with a mark of twelve German aeroplanes shot down until he was wounded in June, since which itme he has been passed by Georges Guynemer, who has bagged fifteen, is facing a long sentence for "disrespect to an officer."

Navarre is charged with going to the Olympia Theater—a vaudeville house—on the night in question; of finding the atmosphere too warm, and of removing his tunic. Coatless, he left his box and sauntered out to the lobby, where an attendant of the theater remonstrated with him and asked him to put on his coat.

For answer Navarre is accused of kicking the theater employee in the shins.

In the mix-up that followed an officer of higher rank than Lieutenant Navarre appeared on the scene, and, failing to recognize Navarre, but noting the aviator's rank by the stripes on his kepi, ordered him to behave himself and put on his tunic.

For answer to the captain, Navarre is accused of spitting in his face.

Meantime the gendarmes had appeared and Navarre was put under arrest.

Sub-Lieut. Nungesser on September 27, brought down two enemy aeroplanes and a captive balloon. This brings his total of aeroplanes brought down to seventeen.

Three other aeroplanes and another captive balloon were brought down on the same day. Fourteen French aeroplanes participated in a raid on the station and barracks at Appilly, throwing down 110 bombs. The night previous twenty-two bombs were thrown on the railway station at Laon and seventeen on the bivouacs at Montiaucon.

The doctor who examined Kiffin Rockwell, recently killed in an air combat with a German machine, has given out the statement that Rockwell was slain by an explosive bullet. He says that after examining the wound he is sure that an ordinary bullet would not have been fatal.

Rockwell will be buried at the spot where he fell in accordance with his expressed wish made the night before his fatal flight.

Sub. Lieut. Guynemer, of France, "The King of the Aces," on September 28, brought down three German aeroplanes in the space of three minutes, completely overshadowing any record hitherto made.

After his remarkable feat a shell burst beneath him and stripped one of the wings bare of its covering. He hurtled down 10,000 feet, but miraculously escaped death. This latest exploit brings his total to twenty-one.

GERMANY

The official report to October 5th follows:

"The navy command reports the following:—At sea Wednesday evening a squadron of seaplanes dropped heavy, medium and light bombs with very good results on the enemy seaplane station near Grado and on military objectives in the Monfalcone, San Canziano and Staranzano regions. Despite the heavy firing at them all our seaplanes returned safely."

GREAT BRITAIN

London, Oct. 4.—King George, it was officially announced to-day, has appointed Second Lieutenant Frederick Sowrey and Lieutenant Alfred de Bath Brandon, both officers of the Royal Flying Corps, to be Companions of the Distinguished Service Order "in connection with their successful attacks upon enemy airships."

It is understood that Lieutenants Sowrey and Brandon participated in the attacks on Zeppelin raiders on the night of September 23-24, when two Zeppelins were brought down.

It has been known for several days that Lieutenant Sowrey had brought down the Zeppelin which fell in Essex, but Lieutenant Brandon had not been mentioned heretofore. Lieutenant Brandon received the Military Cross for bombing the Zeppelin which came down in the Thames Estuary last April.

Official evidence presented at the inquest into the death of the members of the German crew of the Zeppelin which was destroyed near Potter's Bar showed that nineteen bodies were recovered. The jury's verdict was that death had been caused by injuries received while traveling in a hostile airship which was brought down by the anti-aircraft organization.

Britain's newest aeroplanes are setting up wonderful records for the crossing of the English Channel. Fresh from their tasks, these machines have crossed the channel at its narrowest point, where the distance from coast to coast is twenty-two miles, in eight minutes. At its widest points the new 'planes negotiate the distance in from fifteen to twenty minutes. The fastest steamers require an hour and a quarter.

So many machines are being employed by the British on the Somme front and so great is the wastage that the supply has constantly to be augmented. Dozens of the great white birds take the air together almost daily and head for France at three miles a minute.

Under the caption, "Bomb Dropping at Dawn," the British Official Press Bureau has issued an article in which an officer of the Royal Flying Corps tells of the work of the British airmen on the French front.

"Bomb dropping raids," the officer writes, "take place at all hours of the twenty-four, but the majority of the raids are arranged for the period of darkness just before dawn. That arrangement gives the raiders a chance to reach their objective without being spotted by the enemy, and of having daylight to help them find the way home again.

"The Intelligence Officer, after bitterly complaining against people for coming in ones and twos instead of in a batch, so that he has to say the same thing several times over, proceeds to business. 'The place you have to bomb is Z—better go out to sea first and then cross the coast at Y and carry on till you strike the canal.'

"It's your turn. The chocks are pulled away and the tail released. Both throttles wide open, the joy-stick (the universal name for the control lever) is right forward, and you're off in the darkness.

"Moonlight is a powerful friend to the pilot for two reasons, first, because in bright moonlight machines even as low as 300 feet are invisible, but the pilot can see clearly; second, because in the moonlight a searchlight is useless; the beam of light offers no contrast, and seems to die away almost when it starts.

"Searchlights must be avoided if possible, since the guns frequently swing with the searchlight, and the gunner has only to fire along the beam. Also, when the beam of light strikes the machine it dazzles the pilot so that he can see nothing. Suddenly an unnoticed beam swings on the machine, but a rapid turn and dive gets it out of danger before they have time to fire or to bring the light of a second beam into action.

"There are sheds, dimly visible as black rectangular blotches. It has taken ages to find them. A glance at the altimeter shows 1,500 feet; the petrol is shut off. Now the glide starts, 1,200, 1,000 in large, wide spirals; an occasional glance at the sheds, a sharp lookout for searchlight beams, but always an eye on the altimeter—800, 700, 400, 300, petrol on.

"The searchlights are busy again; they can hear you, but it's neck or nothing. Out from the sheds to get the line and then the final trip. Closer and closer, right hand on the bomb release, then judging the angle—let go; one, two—both bombs away. From 500 feet a bomb takes five or six seconds. Still looking over the side you see them—two tremendous flashes—and then down goes her nose, a sharp right bank and out to sea.

"Sauntering gently back to breakfast, flying low over the sands, both engines going well, a fine morning and a sense of having done a job of work."

JAPAN

The following excerpts are from the Sept. 1 issue *Aeronautic World,* of Japan:

Two imperial princes were areoplane passengers at the military aerodrome at Tokorozawa the other day. Prince Asaka and Prince Higashi Kuni were present at the practice of the fifth class aviators. At the invitation of the officers Prince Asaka rode with Lieutenant Tanaka and stayed up five minutes. Prince Higashi Kuni went up next and also stayed up five minutes.

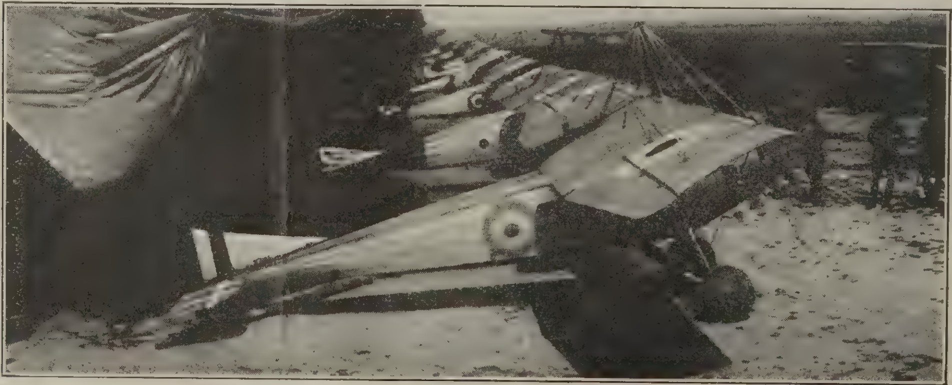
The suit brought by the Imperial Hotel Company against Mr. K. Kobayashi over the payment of hotel expenses contracted by the party of the late Charles Niles, the American aviator who was killed recently by a fall, has been settled out of court. An arrangement was effected through the mediation of Mr. Kushibiki, manager for Art Smith, and a Tokyo attorney, whereby Kobayashi is to pay the Imperial Hotel 650 yen.

A memorial gathering in honor of the late Niles was held by friends of the dead aviator for August 21 at the Imperial Hotel. Mr. Niles made a number of flights in Tokyo and other Japanese cities early this year.

RUMANIA

A Central News dispatch from Bucharest says an American citizen has been killed there by a bomb from a German aeroplane.

The American Minister sent a telegram to Washington regarding the incident and Rumania has addressed a note to the United States protesting against the killing of non-combatants by German aviators.



British machines at an Aerodrome at the Front.

Courtesy Illustrated London News.

MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz

CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Motors for Model Aeroplanes
The C O_2 Motor

(*Continued from page* 790)

It will thus be seen that the above plant is thoroughly well designed and very carefully thought out on the score of efficiency. The speed of the Cetonia model was about 29 m.p.h. The weight of the complete plant is 4 kilogs., and of the complete machine 17½ kilogs. The officially-tested h.p., 1.03 h.p. at 1,710 r.p.m. for 1 min., and it is capable of driving a propeller 0.05 metres in diameter and 0.06 metres pitch (?) (the French is not clear) at 1,800 r.p.m.

In addition to winning the Gordon-Bennett Cup for models, it has been awarded a gold medal (Concours Lépine, Paris), a special diploma, and has also been adopted by the military aeronautical establishment of Chalais Meudon.

And now, with respect to model aeroplanes of smaller size driven by the same means—are we to meet with the same difficulty that was experienced in the case of the petrol motor, or has the long hoped for solution of the problem, "an ideal motor for small aeroplanes" at length been reached?

The type of Cetonia motor referred to is what is known as the A type—the inclusive price in France, 225 francs. In a French catalogue just received, types B and C, ½ and ¼-h.p. respectively, are crossed out, presumably being constructed no longer. So inquiries made in France with respect to certain performances claimed by smaller CO_2 motors of another type, we have received no reply. The longest flight that we can learn of as made by such in England is 20 vards, hand launched. Monsieur Poterin du Motel, the inventor of the Cetonia motors, lays great stress on the necessity of using a hot water cylinder (a cub. ft. of water in losing 1° can raise 3,080 cub. ft. of air 1°) and indeed such is absolutely a necessity. Let us consider very briefly the critical point of liquefaction of CO_2, viz., 31°.35—above this temperature even if under so enormous a pressure as 72 atmospheres (72 × 14.7 lb. per sq. in.) it is impossble for the gas to liquefy—in other words above 31°.35 the gas cannot remain liquid no matter how great the pressure. Again, if the heat absorbed in its conversion from the gaseous to the liquid form is not supplied from some extraneous source—this very quickly has the effect of *solidifying* the remaining CO_2 liquid and immediately stopping the production of the gas.

All the same it does not seem impossible to achieve some measure of success by using (say) a 5-cylinder CO_2 engine of some 7 to 8 ozs. in weight, combined with a liquid-gas cylinder and a *hot-water bottle,* making up an inclusive weight of about 2 lbs., and we do not see why an efficient light-built model fitted with such a plant could not be got to fly.

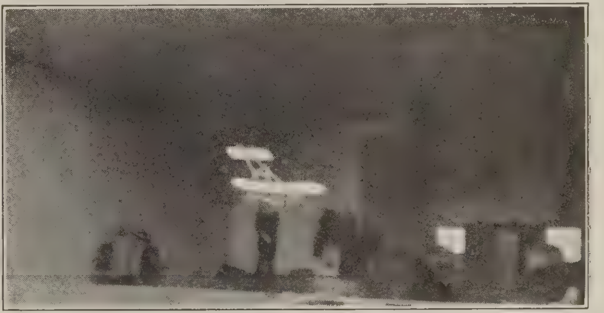
C. W. Meyers, duration model with which he established a new world's record for R. O. G. models.

Aero Science Club of America

The models shown in the accompanying photographs were constructed and flown by C. W. Meyers. With the duration model Mr. Meyers broke the world's record by flying his model for a duration of 178 seconds. This model weighs but 3 ounces and is 38 inches in length. The main wing has a spread of 30 by 5½ inches, the elevator or small wing 14 by 5 inches. Ten inch propellers are used, and to fly the model 8 strands of rubbers is all that is required.

The distance model weighs 5 3-5 ounces and is 40 inches in length. The main wing has a spread of 35 inches, two twelve propellers are used and for motive power 12 strands of rubber are used. With this model Mr. Meyers made a flight of 1,672 feet.

Steel wire is used on both models for the landing chassis.



C. W. Meyers distance model rising from the floor of a hangar at the Garden City aerodrome.

The Texas Model Aero Club

By Robert Melton

On September 24th, the Texas Model Aero Club held an R. O. C. Duration meet at the Army Aviation Field. The meet was practically a failure because of the high winds surging all afternoon. If it had not been for the wind the contest had promised to be a good one, as the models flew well until the wind struck them and they would either go up or down and, unfortunately, it was the latter most. However, these cases were not due to unskillful workmanship, as this important branch of model aviation had not by any means been neglected. Hamer Smith came out with fairly good luck on his first trial, but ended with a broken front plane. All of Carl Gildemeister's models were broken, while Dwight Bourn's record had a higher average of any and was made by one model, which, of although apparently weak construction, stood several very hard collisions with the earth. Such interest was stimulated at many of the contests that large crowds gathered, giving the contestants no peace until they had learned every part of a model from a fusilage or plane to a hook or bearing washer. However, at this contest there were very few, as the aviation field is about six miles from town and three miles from Fort Sam Houston proper. This field offers a very fine space to fly models on, being several hundred meters in each extent.

The record is as follows:

Hamer Smith, (1) 48 seconds; (2) 5 seconds; (3) 3 seconds.
Carl Gildemeister (1) Wrecked; (2) Wrecked. (3) ....
Dwight Bourn (1) 43 seconds; (2) 35 seconds. (3) ....

The judges were C. H. Gildemeister and Dr. Bourn.

Any of the club members would be glad to correspond with other club members in different parts of the country.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

At Hammondsport

We went by motor, commonplace,
And common stopped to dine
Beside the shores of Keuka Lake
Renowned for grapes and wine.

"Be sure you go to Hammondsport"
Kind friends insistent said,
"For there they make a flying boat
That beats all others dead."

"They are so skilled in aeroplanes
This hydro is the last
Of marvels both for speed and form,
It travels very fast."

We gratified the inner man,
Then asked which road to take;
"Oh, here's a guest from Hammondsport,"
Said host; "He knows the lake."

I found indeed he knew "the lake,"
But know a road, not he!
It seemed so queer he could not tell
The way his home might be.

Nor yet to reach famed Watkins Glen,
Nor anywhere. I thought,
"How stupid! What is wrong?" He said,
"I came by flying boat!"

M. C. B.

We are in receipt of the following letter from Mr. A. M. Hendle, of Salt Lake City, enclosing a poem which he asks us to print. We will go him one better and print letter and all.

Aerial Age Weakly,
Gentlemen:—
i incloze a poam wich i rote the uther nite & wich i wish you can print in your paper. if you can not print it will you plese sent it back to me & i will send it to some other plase ware they can uze such articals. i made it up out of my own hed.
with manny thanks, i am yrs trulie,

a. m. hendle.

The poem follows:

The aireoplane is the gratest thing,
wich ever flue the air,
at getting off the ground,
you betcher life its thair.

i seen won wonce and "Oh" said i
"look at the darn thing go"
it flue up almost too the skie
(i cant think of anny rime for go)

So some day i will by won
and fly it awl myself
i reely aught to try won
(i cant think of anny moar rimes, thank you).

Modern Melodrama

The Villain—What is this I see coming to foil muh in muh rewenge? Ah 'tis an aeroplane!

Second Villain—'Tis Wright!

First Villain—Curtiss!

(20 years at hard labor!)

A Spelling Lesson

Plenty of—

Planes
Equestrians
Armour
Cannon
Enlistments
Spell Peace.

Aviation isn't so new when you stop to think. A man in the Seventeenth Century built a chimney and flue.

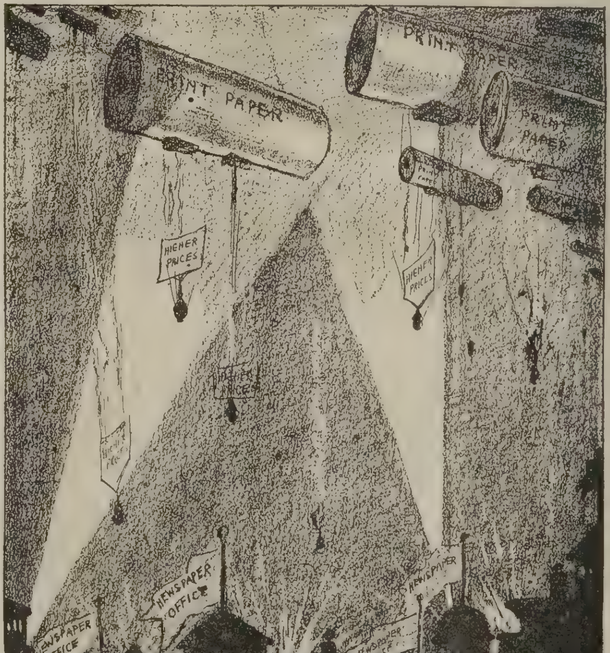
Yes, and even in Napoleon's time, whole armies took to flight! Then again, many people get an inflated opinion of themselves and go up in the air.

Easy

During one of the aviation meets a young woman went through the hangars and after asking the usual foolish questions that aviators have to answer during a tour of inspection, she wanted to know:

"But what if your engine stops in the air—what happens? Can't you come down?

"That's exactly the trouble," responded the willing guide. "There are now three men up in the air in France, with their engines stopped. They can't get down and are starving to death."



Another Aerial Outrage.
Courtesy N. Y. Evening Mail.

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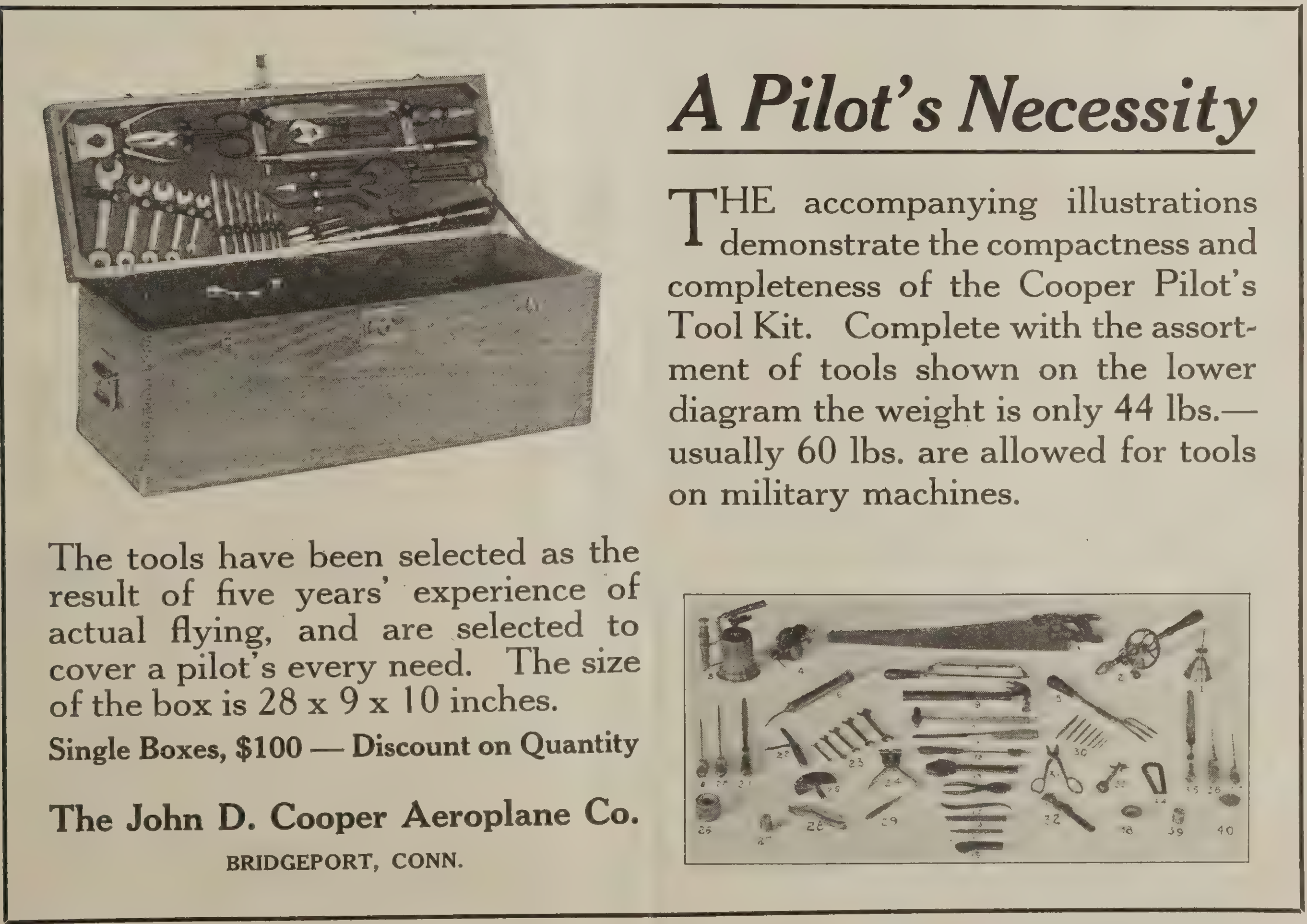

A Pilot's Necessity

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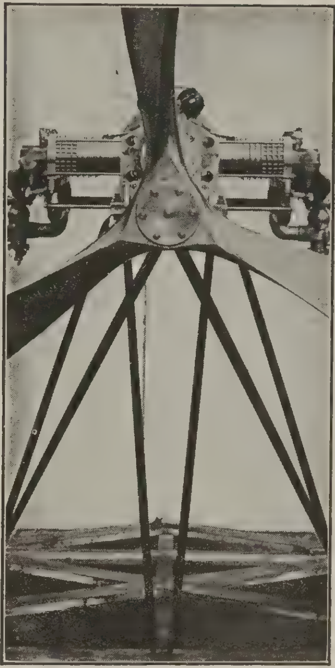

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THE AERONAUTIC NEWS SERVICE
280 MADISON AVENUE NEW YORK

(*Continued from page* 120)

co-operation, through its Subcommittee on Motive Power, with the Society of Automobile Engineers. This latter society has become sufficiently interested in the subject to appoint a subcommittee to act with the Advisory Committee in advance of a proposed change in the organization of the Society of Automobile Engineers, which will result in the extension of the work of that society to cover aeronautics.

This proposed reorganization is largely due to the action of the Advisory Committee in inviting the representatives of the principal aeronautic engine designers to appear at a meeting of the committee held in the Smithsonian Institution on the 8th of June. Already valuable results have been accomplished in the standardization and development of aeronautic engines and Accessories, and it is believed that through the lawful co-operation thus inaugurated a very considerable advance in aeronautic engine construction and design may be looked for during the coming year.

During the past year the committee has obtained a number of valuable reports on various subjects of interest in aeronautics, which reports will be embodied in the annual report of the committee. In order to avoid the delay which would otherwise be involved, due to the necessity of the committee submitting its report to Congress, the several reports will be issued separately by the committee at the earliest practicable date. These reports will cover the following subjects:

Report No. 8—General Specifications for Aeronautic Instruments.
Report No. 9—Aeronautical Nomenclature.
Report No. 10—Gasoline Carburetor Design.
Report No. 11—Exhaust Muffler for Aeronautic Engines.
Report No. 12—The Physics of the Air.
Report No. 13—Experimental Researches on the Resistance of Air.

Report No. 8 has already been published and issued by the committee. Report No. 9, on the subject of aeronautical nomenclature, deals with the terms which are new and peculiar to the science and art of aeronautics, and is intended to eliminate the confusion which has already resulted from the adoption and application of many new terms which have already been evolved in the past few years of the active practice of aeronautics. The committee finds that the interest in aeronautics has grown tremendously during the past year, and is pleased to note that Congress, in its appropriations for the War and Navy Departments, has recognized the value of the new service.

At the annual election of officers, the following were elected to serve for the ensuing year:

Chairman, Prof. W. F. DURAND,
Secretary, Naval Constructor H. C. RICHARDSON, U. S. N.

EXECUTIVE COMMITTEE:

Dr. Chas. D. Walcott,
Dr. S. W. Stratton,
Prof. M. I. Pupin,
Prof. Chas. F. Marvin,
Capt. M. L. Bristol, U. S. N.,
Prof. Joseph S. Ames,
Lt. Col. G. O. Squier, U. S. A.,
Naval Constructor H C. Richardson, U. S. N.

Because of the late date of the passage of the appropriation for this year, the committee is just getting under way to carry on the extensive work provided for in the appropriation, and before the end of the fiscal year expects to have this work well in hand.

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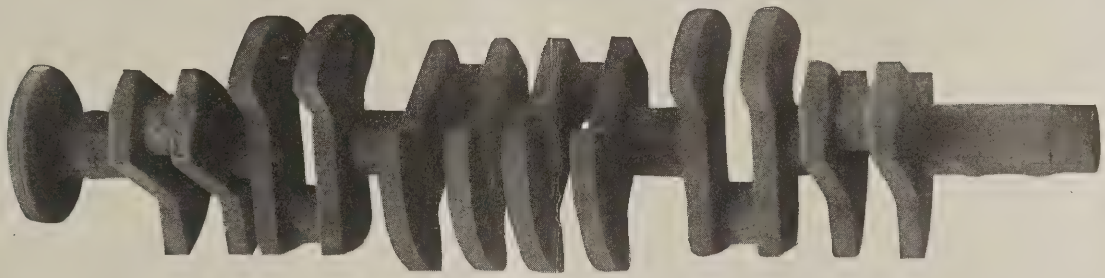

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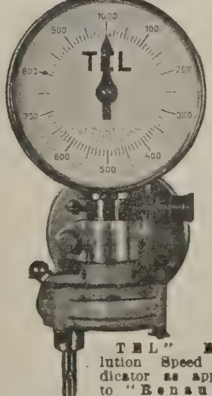

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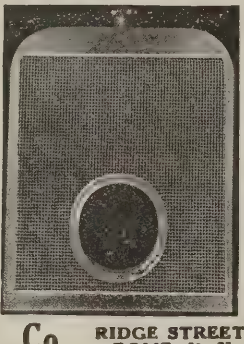

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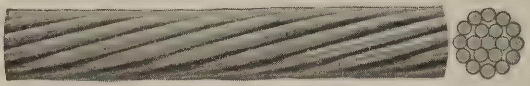

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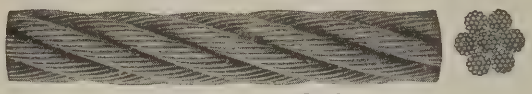

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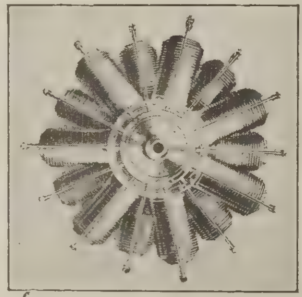

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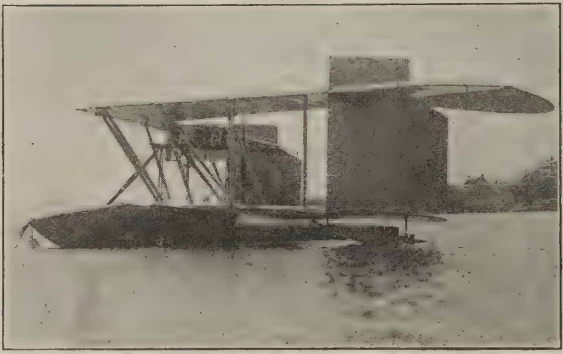

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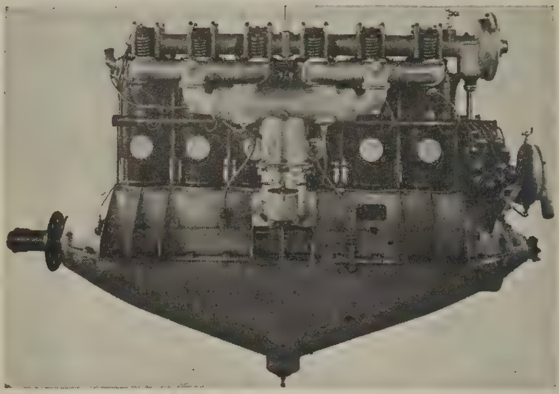

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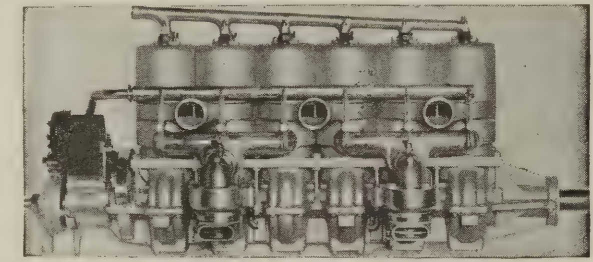
Such a production (which it is expected will not only continue, but greatly increase during the next two years), allows the use of three hundred skilled mechanics, each trained to do his individual part in the manufacturing, assembling and testing of Hall-Scott motors. It permits of systematizing to such an extent that each individual part may be subjected to a careful and rigid inspection after every operation through which it goes before completion. An elaborate and expensive testing department can be provided under such a production, whereby the complete power plants are given a most thorough and exhaustive test by Hall-Scott testers. These tests are witnessed, however, by expert engineers not connected with our company in any way. This insures each prospective purchaser that they will obtain a power plant that is up to Hall-Scott standard. A large experimental room is kept extremely busy with skilled engineers using their best efforts to perfect and improve our present motors. Other types are being assembled and tested by this department in order that the high standard set by Hall-Scott power plants today will continue to be upheld in the future.

HALL-SCOTT MOTOR CAR CO., INC.

General Offices: Crocker Building, San Francisco



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THE MOTORS THAT NEVER BACK FIRE

AERONAUTIC MOTOR

4-X	65 H.P.
6-X	100 H.P.
6-XX	165 H.P.
E-12	350 H.P.

Absolutely the simplest — lightest for actual horse power developed —and most dependable aeronautic motor on the market today. Only one gear in entire motor and the only function it performs is to drive the magneto.

Write for new literature now ready.

THE ROBERTS MOTOR MFG. CO.

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FOR MILITARY, SPORT AND COMMERCIAL PURPOSES

The 300 h.p. twin motor Gallaudet Seaplane built for the U. S. Navy affords unprecedented arc of fire and range of observation.

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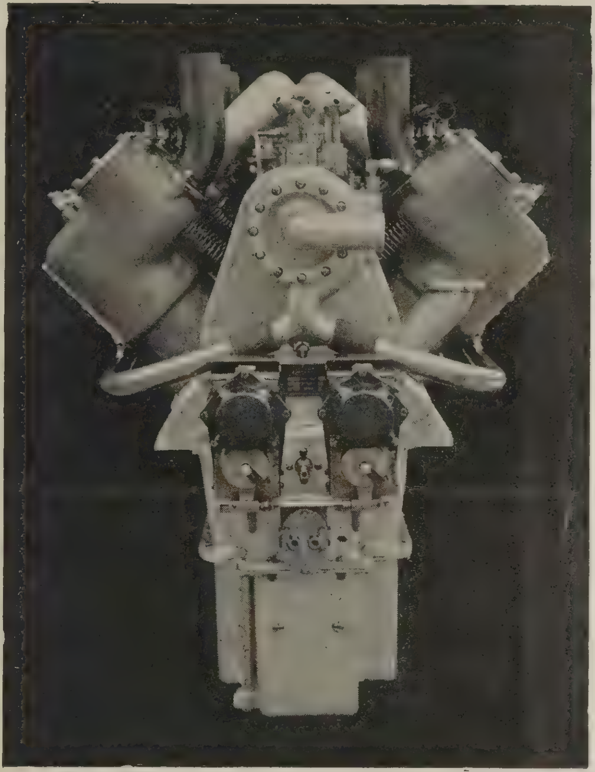


Repeated Tests

of **eight continuous hours** at full load and speed **have proven beyond question** the **reliability** and **durability** of

THOMAS

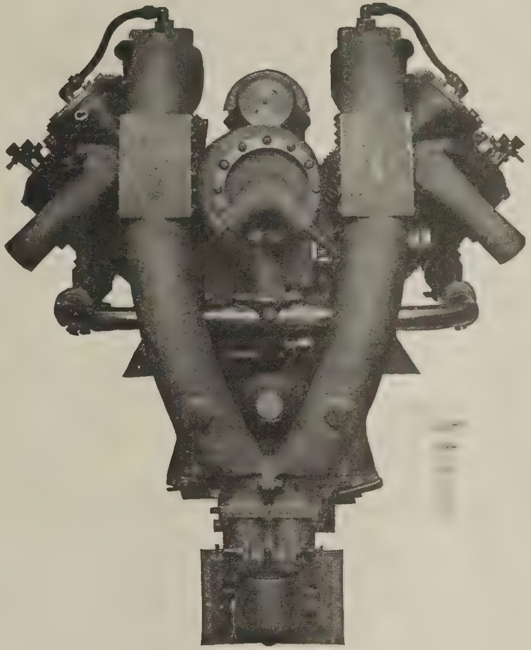
135 H.P. Aeromotors

Three motors recently taken from production **without special preparation** have successfully passed their **United States Government tests.** Prospective purchasers desiring a similar test will be cordially accommodated.

Thomas Aeromotor Co., Inc.

ITHACA, N. Y.

A Question of Responsibility



You who are about to purchase Aeroplane Motors, have you considered the question of responsibility?

Are you satisfied to buy motors, one part of which is manufactured by A, another part by B, another part by C, another part by D, and the motor finally assembled by E? All parts of

Sturtevant
REG. U. S. PAT. OFF.

Aeroplane Motors

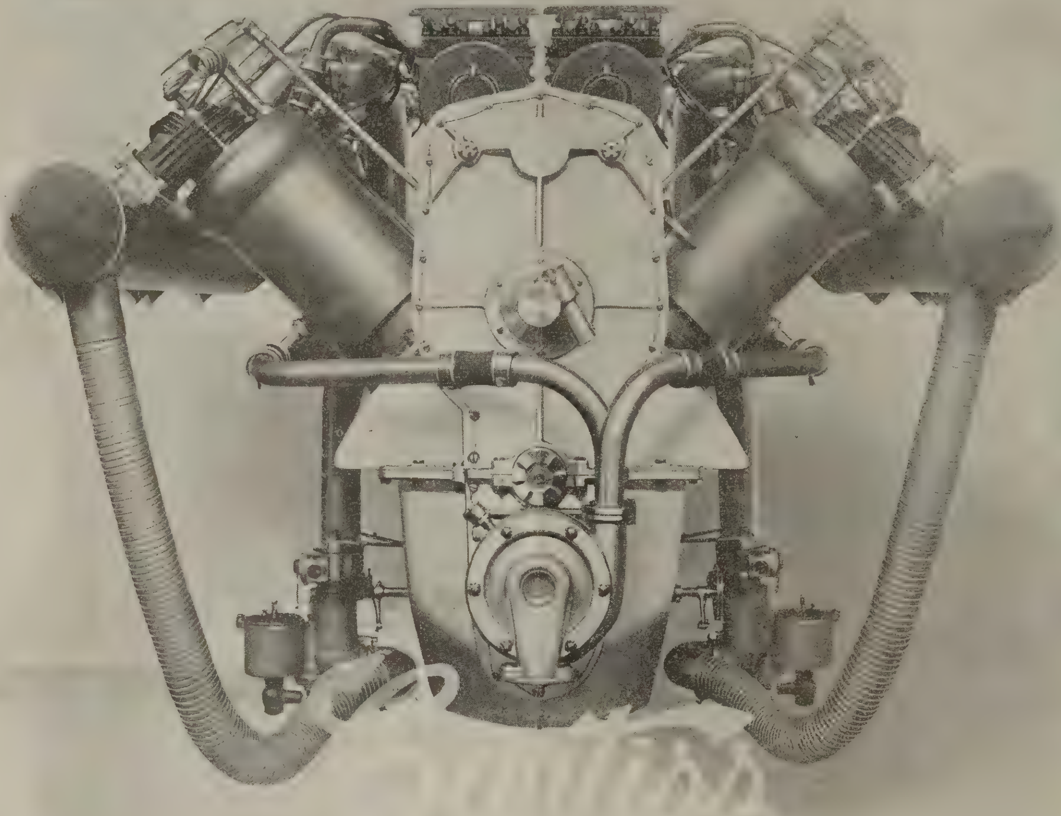
are manufactured by the B. F. Sturtevant Company. The crank shaft is forged in our own forge shop. The cylinder and crank cases are cast in our foundry, the equal of which is hardly found in America. All machine work is done in our own plant on machines especially adapted to the work. Every operation and every part is carefully inspected, and the completed motors are each given the hardest kind of test before they are shipped.

Back of the Sturtevant Motor is the B. F. Sturtevant Company, one of the oldest and largest manufacturing companies of America.

Remember, 140 real horsepower and 580 lbs. of dependability goes with every Sturtevant Motor.

B. F. STURTEVANT COMPANY
HYDE PARK, BOSTON - - MASSACHUSETTS
And All Principal Cities of the World

Important Changes—Considerable increase in efficiency and strength through recent adoption of new features has made this splendid motor even more reliable and powerful. Unlimited tests under all conditions have led to these results.



MODEL
VX

FACTORY FACILITIES

In testing the horsepower of these motors our Electric Dynamometers are the largest for such work that have yet been built.

RATED
160 H. P.

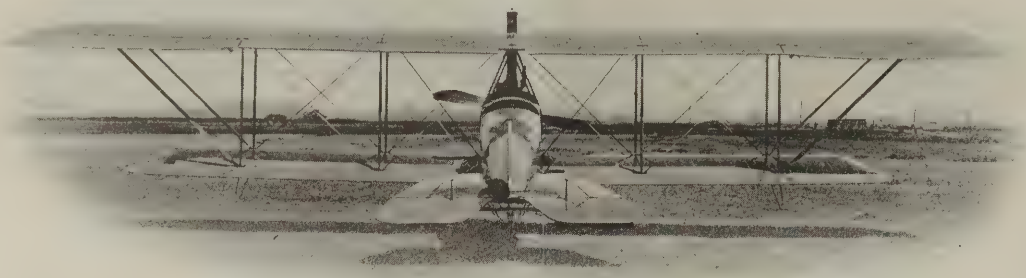
CAREY PTG. CO., INC.

AERIAL AGE WEEKLY

VOL. 4, No. 6 OCTOBER 23, 1916 10 CENTS A COPY

President Wilson Authorizes Organization of Council of National Defense—Expected to Encourage Development of Aeronautics

Limit to Number of National Guardsmen to Receive Aviation Training Removed—Regulations for Aerial Reserve Corps Issued



OFFICIAL Government records of Martin Tractors and Seaplanes give them their enviable position in the aviation world.

RECONNAISSANCE Type R is designed especially for greatest efficiency. Span 46′ 5″, Length 27′. Area supporting surface 400 sq. ft. Two-wheel landing gear. Weight empty 1740 pounds. Useful load 960 pounds. With this load we guarantee speed range 46 to 86 miles per hour; glide 8-1, climb 3000′ in 10 minutes.

DELIVERIES January first. Present output sold until then. Price $10,500.

Glenn L. Martin Company

Los Angeles, Cal.

THE FIRST

PAN-AMERICAN AERONAUTIC EXPOSITION

Grand Central Palace, New York,
February 8th to 15th, 1917
TO FOLLOW THE AUTOMOBILE AND MOTOR BOAT SHOWS

Held Under the Auspices of

The Aero Club of America
The Pan-American Aeronautic Federation
The American Society of Aeronautic Engineers

THE preliminary announcement of the plans of the First Pan-American Aeronautic Exposition has created such tremendous interest, and so many requests for space have been received, that the original plans are being extended and the show space is being doubled.

The Exposition will afford the opportunity to show the tremendous progress that has been made in American Aeronautics in the past two years.

The people of two continents will come to the Exposition to see what the American Aeronautic Industry has produced for National Defense, utilitarian purposes and sport.

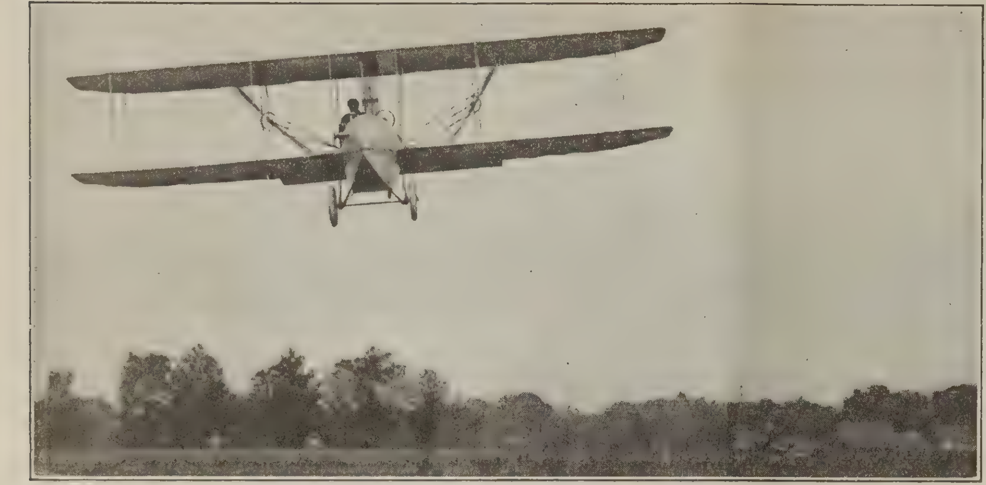
The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos - Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

APPLICATIONS FOR SPACE SHOULD BE ADDRESSED TO

HOWARD E. COFFIN
CHAIRMAN, ORGANIZING COMMITTEE

Pan-American Aeronautic Exposition
297 Madison Avenue, New York



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are universally accepted as skilled and accomplished aviators. Many of those flying marvels whose names are emblazoned in the annals of flight were Wright students.

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The School is located on the Hempstead plains, one of the great world flying fields,—665 acres of treeless land and a hundred square miles over which to safely fly. It is convenient to New York, with steam and electric trains and fast automobile trunk routes.

Camping facilities on the field for the out-of-door man. Good living accommodations within easy reach.

All instruction is in the air. Dual controls. The student is taken into the air on the first lesson.

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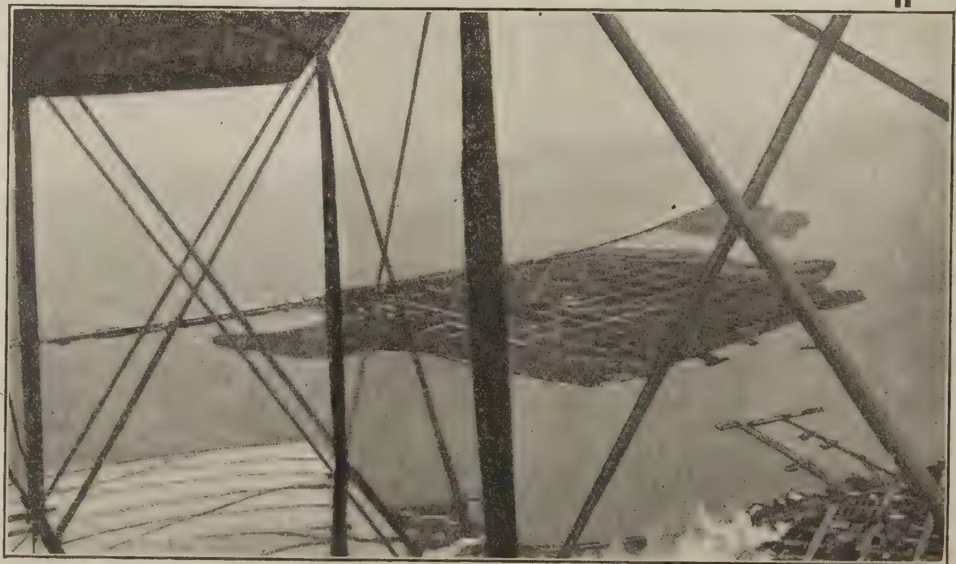

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Vol. IV NEW YORK, OCTOBER 23, 1916 No. 6

COUNCIL OF NATIONAL DEFENSE'S ADVISORY BOARD APPOINTED BY PRESIDENT WILSON—COUNCIL EXPECTED TO ENCOURAGE DEVELOPMENT OF AERONAUTICS

On October 11 President Wilson took the first step to organize the Council of National Defense. He appointed the seven civilian members of the Advisory Board of the Council as follows:

Daniel Willard, of Baltimore, President of the Baltimore and Ohio Railroad; Samuel Gompers, of Washington, President of the American Federation of Labor; Dr. Franklin H. Martin, of Chicago; Howard E. Coffin, of Detroit; Bernard Baruch, the New York banker; Dr. Hollis Godfrey, of Philadelphia; Julius Rosenwald, of Chicago, President of Sears, Roebuck & Co.

Dr. Martin is a distinguished surgeon who was recommended by the Affiliated Medical Societies of the country. Howard E. Coffin has long been active in the American Automobile Association and Mr. Wilson is known to regard him as a man who has done much toward co-ordinating the automobile industry for service in time of national emergency. He is a member of the Naval Consulting Board, an active member of the Aero Club of America and Chairman of the Organizing Committee Pan-American Exposition. Dr. Godfrey is a prominent engineer, who gave up his private practice to assume the Presidency of Drexel Institute in Philadelphia.

Mr. Bernard M. Baruch is a prominent banker, member of the Aero Club of America, reputed of being worth over $20,000,000.

In announcing the appointments, the President issued the following statement:

The Council of National Defense has been created because the Congress has realized that the country is best prepared for war when thoroughly prepared for peace. From an economic point of view there is now very little difference between the machinery required for commercial efficiency and that required for military purposes. In both cases the whole industrial mechanism must be organized in the most effective way. Upon this conception of the national welfare the Council is organized, in the words of the act, for "the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the nation."

The organization of the Council likewise opens up a new and direct channel of communication and co-operation between business and scientific men and all departments of the Government, and it is hoped that it will, **in addition, become a rallying point for civic bodies working for the national defense. The Council's chief functions are:**

1. *The co-ordination of all forms of transportation and the development of means of transportation to meet the military, industrial and commercial needs of the nation.*
2. *The extension of the industrial mobilization work of the Committee on Industrial Preparedness of the Naval Consulting Board. Complete information as to our present manufacturing and producing facilities adaptable to many-sided uses of modern warfare will be procured, analyzed and made use of.*

One of the objects of the Council will be to inform American manufacturers as to the part they can and must play in national emergency. It is empowered to establish at once and maintain through subordinate bodies of specially qualified persons an auxiliary organization composed of men of the best creative and administrative capacity, capable of mobilizing to the utmost the resources of the country.

The personnel of the Council's advisory members, appointed without regard to party, marks the entrance of the non-partisan engineer and professional man into American governmental affairs on a wider scale than ever before. It is responsive to the increased demand for and need of business organization in public matters and for the presence there of the best specialists in their respective fields. In the present instance the time of some of the members of the Advisory Board could not be purchased. They serve the Government without remuneration, efficiency being their sole object and Americanism their only motive.

The organizing of the Council of National Defense is considered the most important step taken so far to develop real national preparedness by Messrs. Alan R. Hawley, President of the Aero Club of America; Henry A. Wise Wood, Chairman of the Conference Committee on National Preparedness, which comprises the thirteen leading patriotic organizations interested in national defense; Rear Admiral Robert E. Peary, Chairman of the National Aerial Coast Patrol Commission; Henry Woodhouse, S. Stanwood Menken, Vice-President National Security League, and other leaders of the national defense movement.

"In saying that the organizing of the Council is the most far-reaching step taken so far for real national preparedness," said Mr. Alan R. Hawley, the President of the Aero Club of America, "I have in mind that so far this country as a nation has been like a house divided. There has been practically no co-operation between the Government, the industries, the patriotic organizations and the people. So our enormous resources and extensive industries have never been co-ordinated, as the best interests of the nation demand. As the Council of National Defense is to do this, and is to establish relations so as to mobilize our national resources for the safeguarding of the nation and the upbuilding of National Defense, which have just been appointed, include over President Wilson's action.

Aeronautics, we expect, will greatly benefit through the co-ordination of our aeronautical resources which the Council may be expected to soon bring about. Interest in aeronautics has really increased tremendously in the past two years and given a reasonable amount of encouragement. The aeronautic movement can quickly develop to the point where this country may be first in aeronautics; first because while other countries are using aeroplanes only for military purposes, we can use hundreds of aeroplanes in connection with the Coast Guard and other utilitarian purposes as well as for sport. In the near future we may also expect to see the employment of aeroplanes for general traveling purposes between places on water and land.

The members of the Advisory Board of the Council of national prosperity, we have reason for feeling gratified most able authorities who are leaders in their respective fields. With the members of the Cabinet they will form a most representative Council, and we feel sure it will afford a great relief to the country to know that there is such a body to consider matters of national importance. The Aero Club of America endorsed the plan for the Council of National Defense as early as May, 1915.

Aerial Age published in the October 2 issue an editorial on the Council of National Defense, giving the act under which it was authorized.

LIMIT TO NUMBER OF NATIONAL GUARDSMEN TO BE TRAINED IN AVIATION REMOVED—REGULATIONS FOR THE AERIAL RESERVE CORPS ISSUED

THE limit to the number of National Guardsmen to be trained in aviation set to fifty in the order issued on September 8 has been removed, and the regulations for the Aerial Reserve Corps have been issued by the Aviation Section of the Army.

The Aero Club of America, ever prompt to help anything that aims to build our aerial defenses, has taken steps to get National Guardsmen and candidates for the Aerial Reserve Corps and has sent to Colonel Squier the names of forty-five college men who have applied to the Aero Club of America for aviation training within the past three weeks.

To further assist the Aviation Section in getting volunteers for the Aerial Reserve Corps the Aero Club of America has decided to offer medals of merit to the students of fifty more universities, colleges and military schools, making one hundred institutions, having about 350,000 students that will receive these medals of merit. These are to be awarded to the three students who write the best essays on—

(1) Military aeronautics;
(2) Mechanics of the aeroplane and possible technical development in aeronautics;
(3) Possible application of aircraft for utilitarian purposes.

Only Three Army Aviation Schools at Present—To Be Increased as Fast as Necessary

The official announcement states:

There will be two general categories of schools: (a) The United States Aviation Schools (such as the one now at San Diego, Cal.), whose number, for the time being at least, is intended to be three; that is, one for the Pacific Coast, one for the Central States, and one for the East; (b) civilian schools maintained by manufacturers or others, which may be utilized for preliminary training purposes.

The country will be divided into three school districts. The commanding officer of the school at San Diego will have general jurisdiction over all the schools in the Western Department; the commanding officer of the school in the central part of the country will have jurisdiction over all the schools in the Central and Southern Departments, and the commanding officer of the school in the East will have jurisdiction over all the schools in the Eastern Department.

It is intended (eventually) to send aviation personnel for all foundations, except those of the Regular Army, to civilian aviation schools to obtain their preliminary instruction, after which they may finish their course at the Army aviation school and obtain their aviators' rating.

The civilian schools will be handled along the following lines:

(a) A type of training machine will be prescribed by the Government for the use of schools; (b) the schools will be given certain compensation for the instruction of such personnel as may be assigned to them—this reimbursement will include the average brokerage and will be paid when the student satisfactorily completes the course; students before assignment to a civilian school will be subjected to an examination by a board to determine their physical, mental and moral qualifications to take the course.

Having completed their instruction, the students will be available for commissions as reserve officers and assignment to units or other duty.

Detail of Officers and Enlisted Men of the National Guard at Signal Corps Aviation Schools

Officers and enlisted men of the National Guard may be detailed at Signal Corps aviation schools under Section 99 of the National Defense Act. National Guard officers and men desiring such course will put in their applications to the Adjutant-General of their respective States who will forward the applications direct to the Chief, Militia Bureau, War Department, Washington, D. C. Such officers and enlisted men will be required to pass the prescribed physical and mental examinations which will be similar to those required of reserve officers, Aviation Section, Signal Officers' Reserve Corps. On approval by the Militia Bureau orders will be requested from the Adjutant-General of the Army assigning such officers or enlisted men to duty at aviation schools.

Requirements for Service in the Aviation Section, Signal Officers' Reserve Corps

The requirements for service in the Aerial Reserve Corps, authorized by President Wilson on the recommendation of the Aero Club of America, July 13, 1916, are as follows:

1. Authority has been issued by the Secretary of War for the organization of the Aviation Section, Signal Officers' Reserve Corps. The section may consist of 296 officers. The grades in said section shall be in the same proportion as those obtaining in the Aviation Section of the Signal Corps, United States Army, up to include the grade of major. Unless especially authorized by the officer in charge of the Aviation Section, all successful applicants for commissions in the Aviation Section, Signal Officers' Reserve Corps, will be commissioned in the grade of second lieutenant.
2. Any male citizen of the United States, not under twenty-one nor over thirty years of age, desiring a commission in the Aviation Section, Signal Officers' Reserve Corps, will submit a letter in the following form to the Adjutant-General, United States Army; to the Adjutant of the department in which the applicant lives or to the officer in charge of the Aviation Section, Signal Corps of the Army.

Letter of Application for Examination for Commission in Officers' Reserve Corps

(Under Section 37, Act of June 3, 1916)

.... 19.....

The.............................

Sir—I have the honor to apply for examination for a commission as (1)..................*of* (2)..................(3)................. *in the Officers' Reserve Corps, organized under the authority of Congress.*

I have served.............*years in* (4)..................

I have pursued a regular course of instruction for......... *years in* (5).......................

I graduated in the year...........*from* (6)............... *after having creditably pursued the course of military instruction therein provided.*

I was born...............*and am* (7).................. *a citizen of the United States. My business is*............... *My experience is*......................... *I enclose letters of recommendation and addresses of citizens who know me as follows:*...

Respectfully,

....

....

The correctness of the statements above made was sworn to and subscribed before me.........................19....(8)

....

....

....

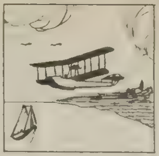
(1) Insert grade.
(2) Insert branch of service, staff corps, or department, as Cavalry, Field Artillery, Coast Artillery, Infantry, Quartermaster Corps, etc.
(3) Name staff position, and in this case rule out 1 and 2.
(4) Insert service in Regular Army of the United States, or Volunteer forces of the United States, or Organized Militia of any State, Territory or District of Columbia; also state in what capacity.
(5) Insert name and location of school or college.
(6) Insert the name and location of the educational institution in which an officer of the Army or Navy has been detailed as superintendent or professor pursuant to law.
(7) Insert "not" if in accordance with fact.
(8) Oath to be taken before, and signature to be made by, officer authorized by law to administer oaths.

Note.—The foregoing is the form to be followed in applying for examination, and is to be addressed to the Adjutant of the department in which the applicant lives. The Adjutant-General of the Army or the head of the staff corps or department concerned.

The communication authorizing the examination of the applicant will be sufficient authority when submitted to the president of the examining board before which the applicant will be ordered to appear. This board will consist of from

(*Continued on page* 153)

THE NEWS OF THE WEEK



Members of Second Aero Company, New York National Guard, Continuing Training at Private Expense

The members of the Second Aero Company, N. Y. N. G., who were denied assistance to get aviation training by the Army Aviation Section, are continuing their training at private expense.

The Second Aero Company, N. G. N. Y., was ordered to return to its home station in Buffalo and be relieved from active service on September 16. The summer spent in active service at Mineola, L. I., was a great waste of time and most unsatisfactory, because there were not nearly enough aeroplanes and instructors. After the company's return to Buffalo, its commanding officer, Captain John M. Satterfield, went to Washington and applied to the War Department for equipment and funds to make the company efficient. He found that the attitude of the department was decidedly unfriendly to militia aero companies, and that neither money nor equipment was forthcoming from the Department, although Congress had appropriated $9,640,000 for development of the militia air service. Appeal was again made to the public for funds and again Government work is to be done with private money. Captain Satterfield has arranged for the use of three aeroplanes and two instructors at the Curtiss flying field in Buffalo, and the company is advancing far more rapidly now than it did under Federal control. Ten of its members are flying regularly and are making excellent progress. They are: Captain Satterfield, Lieut. More, Lieut. Bryant, Sergt. Waring, Sergt. Fox, Sergt. Tifft, Sergt. Hickman, Sergt. Knight, Corp. Lewis and Private Simons.

Two of the machines are being used for instruction and some of the men who are flying alone. All are Curtiss J. N. 4 Military Tractors. As the instruction for all men will be completed within a very short time, it is expected that another machine for flying alone will be made available shortly. Three of the men are now ready for their R. M. A. tests, and if weather conditions continue favorable for a few weeks longer, there will be from four to six R. M. A. men in the company within a month. A number of the men are working in the Curtiss factories to gain practical experience with motors and planes.

The company is meeting at least once a week at the Armory of the old 65th Regiment for drill and lectures in military aviation.

Aeroplanes to Patrol Coast

Three of the reserve fleet of the destroyer force, the Smith, Lamson and Monaghan, have arrived off the New England coast, showing that the Navy Department evidently intends to use these boats in the naval patrol of the coast.

The arrival from the South of the armored cruiser North Carolina, the only "mother" ship of the Navy, leads to the belief that possibly the aeroplanes on the ship are to be employed in the search problem, too. The North Carolina is to go to the Portsmouth Navy Yard after stops at New London and Boston.

Eastern Aeroplane Co.'s Tractor in Trial Flights

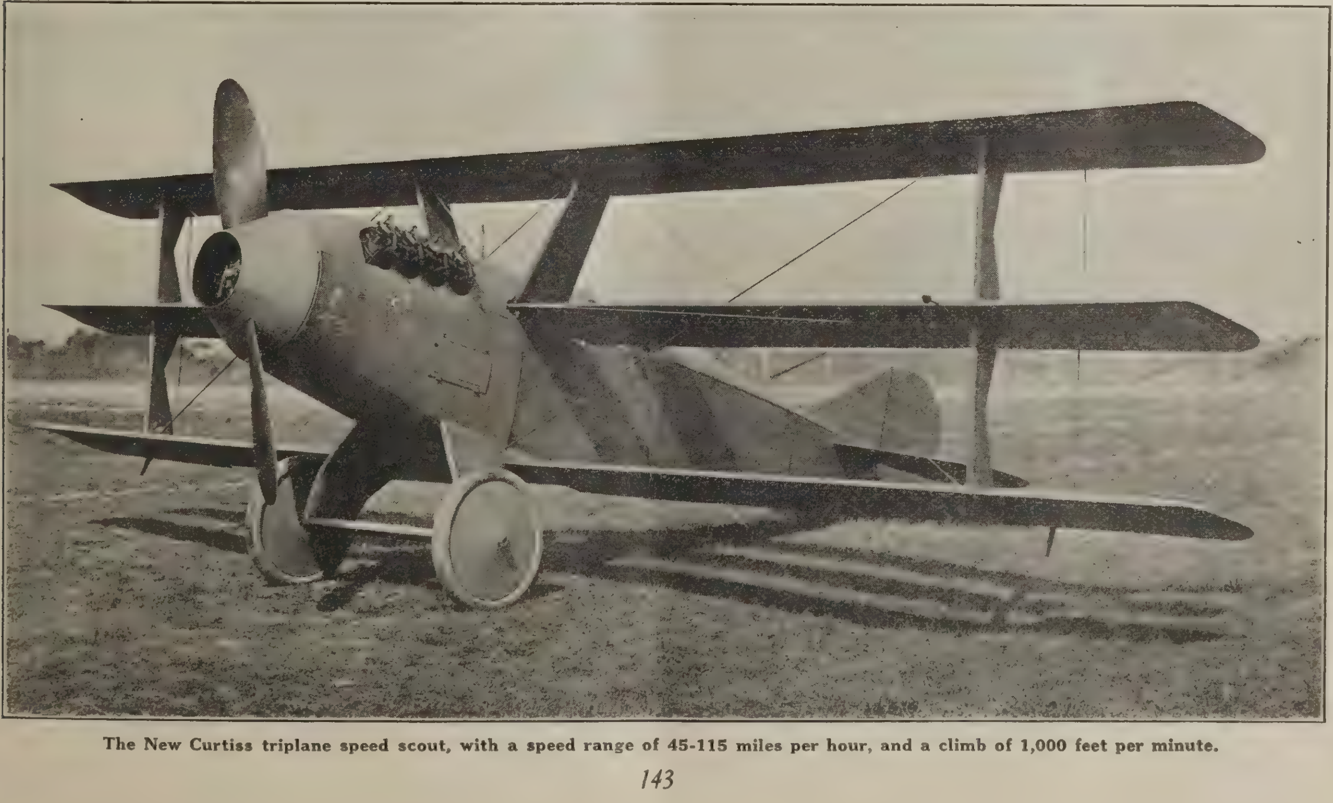
The new tractor biplane, designed by Fred Hild, of the Eastern School of Aviation, brought to Garden City recently, is now being tried out by Tex Millman and Mr. Hild. Last Sunday Millman made five flights and declared that he found the machine easy to control, and remarkably steady. From the ground, observations made of the flights showed that the machine was quick to climb, and although making an average speed of about seventy miles an hour, its slow landing speed and fine balance made for easy landings. Millman and the visitors at the hangar were enthusiastic in their praise of the excellent workmanship and construction of the machine.

To Stimulate Aviation Interest in Indianapolis

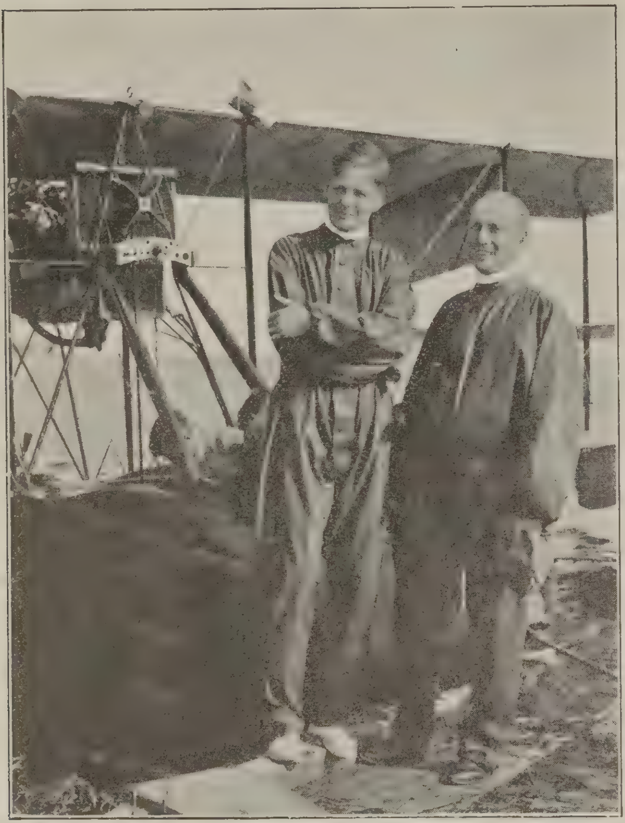
Aviation in Indianapolis will receive fresh impetus with the arrival next week of George L. Bumbaugh and two aeroplanes from the Curtiss Flying School, Newport News, Va. Capt. Bumbaugh is well known in Indiana flying circles. He organized an aviation corps which was offered to the Indiana National Guard shortly before the mobilization at Fort Benjamin Harrison. Owing to the lack of legal authority the unit was not accepted. Bumbaugh was a private in the Signal Corps at the time. He has just been graduated from the aviation school and writes to Adjt.-Gen. Frank L. Bridges concerning the possibility of assisting in the training and formation of a corps of flyers here for the I. N. G.

A Correction

On page 776 of the September 11th issue of AERIAL AGE we described an illustration as the "mounting of the Hall-Scott 'Big Six' in a Glenn L. Martin military tractor." This should have called attention to the fact that the mounting was in a Christofferson military tractor of the latest type, two of which are being constructed for the Army.



The New Curtiss triplane speed scout, with a speed range of 45-115 miles per hour, and a climb of 1,000 feet per minute.



Lawrence B. Sperry and Bob Fowler after "Bob's" first flight in a stabilized flying boat.

Major Chandler Heads Section on Aerostatics U. S. A.

Major Charles de F. Chandler, U. S. Signal Corps, one of the veterans in ballooning and aviation, has taken charge of aerostatics in the office of the Signal Corps at Washington. In his charge will be the getting and operating of dirigibles, kite balloon, free and captive balloons and kites.

Twelve Rise with Flying Boat

An enormous flying boat, built after the design of the America, rose from Lake Keuka at the flying field at Hammondsport October 16, with eleven passengers seated in the cabin. The pilot made the twelfth member of the party.

At five hundred feet the machine soared on the air currents over the lake. The return trip was made with ease and the landing was remarkable for its accuracy.

The new flying boat is of the pusher type, with two V-X3 Curtiss 200 h.p. motors.

Doehler Die-Casting Co. Make Change

The Doehler Die-Casting Co. announces the removal of its Brass-Back Bearing Department from the Brooklyn to their Toledo plant.

An entire new factory building, housing foundry and machine shop, fully equipped with all modern labor-saving devices, is devoted to the exclusive manufacture of the justly famous "Doehler" babbitt-lined brass-back bearings.

Six Navy Aircraft Ordered

Contracts have been awarded by the Navy Department for six aeroplanes and six power plants to be delivered to the aviation station at Pensacola. The entire award was made to the Sturtevant Aeroplane Company, of Jamaica Plain, Mass., at $4,800 for each aeroplane and $3,050 for each power plant. Three of the aeroplanes will be equipped with floats of the department's design and three with floats of the manufacturer's design.

Pershing's Mail Carried by Aeroplane

It was disclosed at the War Department that official mail from General Pershing's headquarters in Mexico to the army base at Columbus, N. M., is carried by aeroplanes.

An aeroplane makes the flight from headquarters, 120 miles on the Mexican side of the border, to Columbus in sixty-six minutes. Formerly the mail was transported by trucks, which made the trip in four days.

Hammond Torpedo To Be Tested Soon

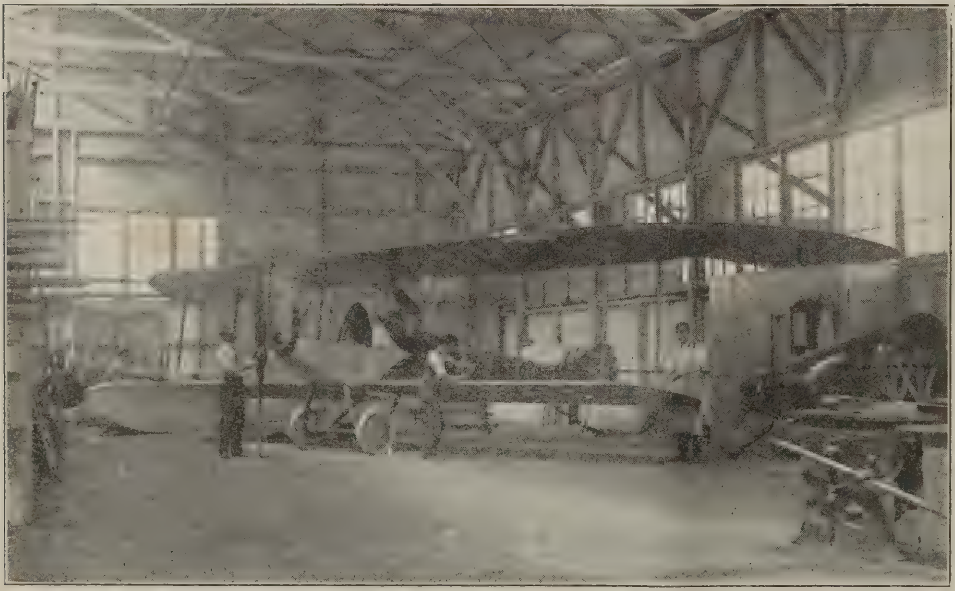
Experiments with wireless guidance of torpedoes from an aeroplane, an invention of John Hays Hammond, Jr., which may revolutionize American coast defense, will be tested at Gloucester, Mass., next month.

Keenly interested in the previous tests of Mr. Hammond's apparatus for steering and operating from the shore by radio waves his yacht, the Natalia, the War Department has lost no time in taking up the inventor's latest project and has detailed Lieut. Sheppley W. Fitzgerald, U. S. A., an experienced military aviator, to pilot the aircraft in the experiments.

A specially designed seaplane of the Burgess self-balancing type is now under construction by the Burgess Company at Marblehead for the trials here. It will be a large weight-carrying machine, capable of lifting a useful load of more than half a ton.

On it will be mounted the apparatus for controlling the torpedo in the water below, and for directing it against hostile warcraft. Should the tests prove conclusive, and the War Department provide coastal points with a sufficiently large number of suitably equipped aeroplanes, a landing by any invader on United States shores would be virtually impossible.

For the aeroplane will operate from a height which will render it immune from gun fire and, providing the apparatus fulfills its promise, can guide its torpedoes with unerring accuracy. The invention also makes possible the use of torpedoes in water too shallow to be utilized by submarine operating under the service, and its place in national defense against invasion by sea is virtually limitless.



Interior view of the Christofferson factory, at Redwood City, showing one of the machines being constructed for the army.

The design of the aircraft has been worked out with the utmost care by W. Starling Burgess, of the Burgess Company under orders from the War Department, which is providing funds for the experiments, and Lieut. Fitzgerald is now practicing on the Burgess school machine in order to become thoroughly familiar with the Burgess-Dunne type.

The new aeroplane will be completed and equipped about November 15, and the tests will begin here at once off Mr. Hammond's coast radio station, the tall wireless masts of which are well known landmarks for submarines.

Lectures on Aeronautics

During the past ten days G. Douglas Wardrop, editor of Aerial Age, has been extraordinarily active lecturing to important clubs, organizations and colleges on various phases of aeronautics. At Ithaca and Syracuse the university students showed an enthusiastic interest in aviation, and there is every possibility that both organizations will henceforward take even a greater and more practical interest in the subject.

At the Syracuse Technology Club, Mr. Wardrop was enthusiastically received by one of the largest meetings of its members that the club had ever had, and a general idea of the interest in the subject among the members can be gained when it is stated that Mr. Wardrop commenced his address shortly after eight and was responding to questions of his auditors at 11 o'clock.

On October 13, the citizens of Williamsport, Penna., were made familiar with the part the aeroplane is playing in the war, and the status of our industry, and Mr. Wardrop succeeded in stimulating a strong public interest in the Atwood Aeronautic Co., the local construction concern. The Rotarians of Williamsport at their luncheon meeting on the same day were astounded at Mr. Wardrop's story of the progress of the last year. They all became enthusiastic boosters, as becomes Rotarians.

On Monday, October 16, Mr. Wardrop spoke before the luncheon meeting of the Advertising Club in New York City. This club is carrying through a series of luncheon talks, and the excellent attendance of members on Monday was an excellent augury of the interest the advertising men are taking in the aeronautical world.

On October 19, Mr. Wardrop showed the members of the Railroad Y. M. C. A. by stereopticon slides the many advantages of air versus railroad travel. They were tremendously interested in their future competitor.

THE TIMES' CHICAGO-NEW YORK FLIGHT

During the past week Victor Carlstrom has been tuning up and testing the machine which he will pilot from Chicago to New York in a non-stop flight sometime during the next week.

The first experimental flight was on October 14, when Carlstrom was in the air twenty-two minutes. It left Carlstrom convinced that, while minor changes may yet be necessary in the big machine which the Curtiss Aeroplane Company has been preparing for his attempt to break all non-stop cross-country records, the aeroplane is adequate to the task. One of the alterations decided upon after the flight was the installation of a somewhat larger propeller.

Mr. Carlstrom said after the flight that he thought the twelve feet of extra wing spread, put on the machine when it had been intended to use it for a time-endurance test with five passengers, would have to come out, but that he would not decide positively as to that until after another trial. Even without this extra center panel, which increases the wing spread from forty-eight feet to sixty, the planes, according to Carlstrom, seem strong enough to lift with ease the weight of the machine and the enormous quantity of gasoline which it must carry; and the additional surface of the center panel, exposed to the friction of the wind, would be likely to reduce the speed.

The crowd at the Curtiss Field saw Carlstrom ascend in the bright, sunshiny weather. Though nearly dry along the course on which the aeroplanes start, the field was studded elsewhere with puddles of water and mud, and a cold wind swept in from Lake Erie at a velocity of more than thirty miles an hour.

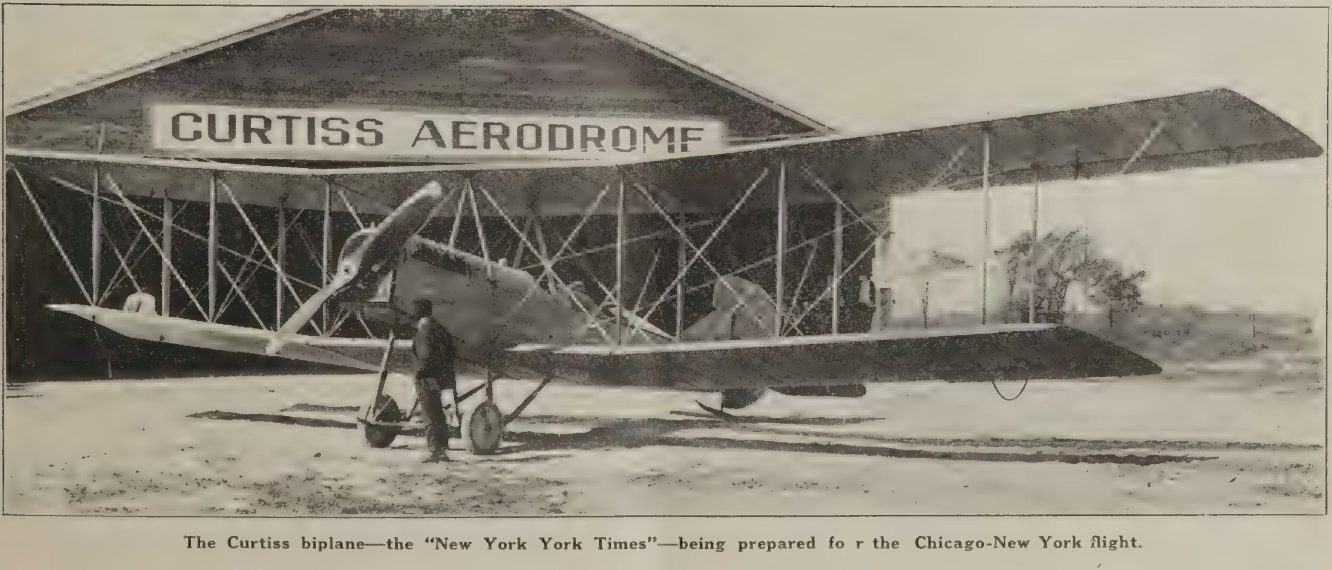
In front of the hangar before the flight stod the *Times* machine with its name, "The New York Times," lettered in bold black on the dust brown linen of the fuselage. Half a dozen mechanics were pottering about, putting on the finishing touches, while the crowd, which had expected to see the first flight of the big machine on several previous days, watched every movement they made.

"The New York Times" cannot be called a beautiful aeroplane. It is built for stability and endurance, a thing solid and dependable. Nearby stood the little triplane speed scout which every man connected with the Curtiss plant loves as if it were an only daughter. She—an aeroplane, it appears, is always "she"—is referred to affectionately as "The Bird," and she looks like a bird. Her trim, graceful lines, her lithe, compact, powerful body and wings, in which there is not an inch of superfluous space or an ounce of needless weight, suggest a humming bird.

Compared with the speed scout, the "The New York Times" has a mature and portly figure. Her wings slope upwards at an unusually high angle, which make for stability, they say—but not for beauty.

The little triplane weighs not much more than 1,100 pounds, the ordinary Model R biplane about 1,900 without gasoline, a little over 2,400 when her tank is full. "The New York Times" weighs 2,250 pounds with no gasoline in her tank, and when this immense tank is full and when she carries in addition an extra supply of water and oil and an aviator, her weight runs close to 3,750 pounds.

Carlstrom is confident that the long and careful preparation has fulfilled its purpose and that there is little likelihood of any further material defect developing in the machine.



The Curtiss biplane—the "New York York Times"—being prepared for the Chicago-New York flight.

REPORT OF NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

What the Army and Navy Want—Prominent Engineers Discuss Power-Plants

The Chairman. Lieutenant Child, will you give the committee and gentlemen present the benefit of your experience in the line of motors?

Statement by Lieutenant W. G. Child, U. S. Navy.

Lieutenant Child. Our experience in the Navy has demonstrated that at some time or other almost every part of the motor has given trouble. I do not think you could name a part of it that has not broken at some time or other. But when a break has occurred, and the attention of the maker has been called to it, in many cases it has been remedied, so the per cent. of casualties now is very much less than it used to be. Personally, I think we have got to get to some medium, or some average weight for a good reliable motor. It can not be too light and, of course, it can not be too heavy. In considering what average weight we should have, the fuel consumption should certainly be taken into consideration—the fuel consumption, say, of a ten hour flight.

Another question coming up would be the question of installing motors of practically the same horsepower in the same machine. At present, if you have your beds built for one motor, it is probable that you can not put another motor of the same horsepower in the machine because of difference in the brackets. I think one way of overcoming this, without changing the design, would be to make the brackets wider, say four inches, and not drill bolt holes, so that any motor could be installed on foundations that would take the width of that bracket.

The question of magneto troubles has just been discussed and we have had, of course, the same trouble, and it has been very serious. We have had to change magnetos very frequently, due principally to the shaking apart of the magnetos, caused by vibration of the motors. That, of course, brings up the question of the balancing of parts, and having similar parts the same weight.

With regard to the question of spark plugs, we find now that they are giving a great deal of trouble on account of burning the points. We find that they burn in the porcelain and burn right down. On one motor that we recently tried, which ran with very little vibration and had on it a Bosch magneto, the magneto was the only part that gave trouble. The motor ran for three five-hour runs without any trouble but that one. When that was remedied the motor went through its runs all right. But that trouble could not be caused by vibration, because there was so little virbration in that motor.

As we get higher horsepower in motors, it seems to me an advantage to have electric ignition, because we have got to have starters. It is probable that the electric ignition will be used because you save in weight by using electricity, and you need a hot spark at low speed. I think there are a number of motors developed to a sufficiently high state of reliability that they can be used. If magneto ignition is used, weight is saved by using an air starter.

The question of radio comes up, whether it is better to drive your generator from the motor, or whether you would use a wind driven generator, or whether it should be separately driven by a small motor. That is a question which should be discussed.

There is a question of having a large lower crank case to keep your oil, or of having separate tanks. I think the separate tank system would be better. It would lighten your engine a little, and at the same time would give you an extra supply, and would help cool your oil, and permit you to carry any quantity of oil you wanted. You could install your tank at any convenient place. In addition, with a little oil in the motor, you would not have the trouble of flooding the cylinders in gliding.

We have had a good deal of trouble with tachometers. The electric tachometer has not stood up and we have never had an electric tachometer that has stood up. I ran across a "Reliance" tachometer in Boston, which I heard is giving very good results.

I saw an oil gauge in Chicago that works on a different principle and that costs less than a dollar apiece, and I have been told it has never given a bit of trouble and that it has done the work it was required to do. If anyone wants the address of the maker, I can give it to him.

There also comes the question of standardization of the propeller shafts, so that we can use the same propellers on various motors of similar power. It would be preferable to have propellers with removable blades, that is, you would have a hub from which you could remove the blades.

I understand that a number of experiments have been made with mufflers, but no suitable one has been developed. They have been either too heavy, or have not done the work, or have blown up.

I think one of the greatest problems in aviation is the design of a suitable radiator. We all know that the resistance of the radiator means a tremendous loss of lifting capacity, and it seems to me that there is a great field for research work to develop a proper radiator design. We found from experiment that one type of radiator had a very low resistance and was about five times as effective as another type that was in very general use. We can only find out by experiment which radiator will do the work most efficiently. It seems to me that this is one of the greatest fields for development, and one of the most important, too.

I do not remember any other points to bring up just at this time.

The Chairman. Colonel Squier, I would like to ask you—you have had a good deal of experience in the early days in regard to motors—if you could give us the benefit of some of your experiences.

Statement by Lieutenant Colonel George O. Squier, U. S. A., in Charge of Aviation Section, War Department.

Colonel Squier. I think the last speaker has given us something pretty definite. It is a point very well taken to start this discussion. I know something about the motor difficulties abroad, where they have solved, or have attempted to solve, their difficulties by an authorized national engine competition to pay a ten thousand pounds prize. The Navy and Army joined together and asked the manufacturers to compete for the prize. I got possession of a report on that test. It is a confidential report. It gives the qualities and strength of materials, methods of testing, and the whole thing. It is a very serious matter to conduct such a competition. That competition brought out the Green engine. It put England in a position to produce aeroplane engines. Two or three years ago she had to get her engines from France. When she discovered that, she developed an engine of her own in this way. Better than that, she——

The Chairman. Is that Green engine making good now?

Colonel Squier. It is the one that they are using.

The Chairman. How high a power?

Colonel Squier. As high as two hundred and fifty horsepower. It is a splendid engine. They put two of those on an aeroplane, and thus it means five hundred horsepower. They have several others—the Rolls-Royce is one of the best at present.

The Chairman. Have the French developed any engines since the war began?

Colonel Squier. Yes; one or two. The rotary type of cylinders has disappeared on them.

I have this Judges' Report available to the committee. It is a full account of the whole competition and shows the way England developed her aviation service.

Prof. Pupin. The Chairman referred to statements which have been made on this subject, that the foreign art of aviation is far ahead of the American. Do you believe that there is any truth in that?

Colonel Squier. Well, I think there is no doubt they are doing things we have never done here. That is so in all the belligerent countries.

Prof. Pupin. Are they so very far ahead?

Colonel Squier. That would be a matter for considerable discussion. They do wonderful things over there. They do perfectly wonderful things every day, due to the stimulus of war. All have to fight for their very existence.

Prof. Pupin. Is not information available which would enable us to get the benefit of some of their experiences?

Colonel Squier. A considerable amount of it is. A certain amount is not. If you wish to have a scale drawing of one of the large machines of five hundred horsepower, I do not know whether you could get it. You could not expect them to give this country any such information.

The Chairman. The way they are doing, they are capturing each other's machines and learning from them.

Colonel Squier. Yes. Immediately when they capture a machine they take it over to the Government Aircraft Factory; take it all apart; they have it all spread out and see where the other fellow's improvements exist, and everything else. They study it with a great deal of care. The German engine does not look like the English engine. It is very stimulating to see how one problem can be solved equally efficiently by different paths. The best way to do that is for them to spread it out and look at it. I have no doubt the other nations do the same—capture enemy machines and study them. And, of course, the art over there is going forward in leaps and bounds. They are accomplishing things we have not thought of attempting here at all. That is perfectly natural to my mind.

Prof. Pupin. Yes, of course it is.

Colonel Squier. For instance, they make an aviator fit to go to the front in four months. That is very natural, I think. But I think you could not produce an expert aviator in four months, or three times four months, in peace times; but war brings out qualities in people they did not themselves know they had. I have nothing further to say at this moment.

The Chairman. Captain Bristol, will you state your experiences?

Statement by Captain Mark L. Bristol, U. S. N., Commander of the (Navy) Air Service.

Captain Bristol. I was very much interested in what Mr. Souther had to say as to the method of procedure in the development of the motor and, of course, agree with him entirely. The trouble we have had in the Navy in regard to the development of aeronautics has been principally the lack of a suitable motor. That has been our great trouble and we could not go ahead as we might have done in the development of a naval aeroplane if we could have gotten a motor.

For a long time we have been endeavoring to interest motor car manufacturers in this country in aeronautic motors. We found that was very hard, because they had a large amount of business, even before the war started, which gave them a profitable return. They had nothing to look forward to in aviation, because the Government appropriation was so small, and there was no demand for aeroplanes in private life, except among the very few sporting men who had a large amount of money to spend on them . The business was very small and, therefore, very little could possibly be done to interest the real motor builders in this country.

Some people took up the building of aeronautic motors, but without sufficient scientific knowledge to design and construct motors, and they worked along on a process which we all understand is to a great extent a "cut and dry" process. In the development of motors some of our naval officers assisted very materially, especially some of the aviators. This method of development has continued, but now there are some prominent motor builders in this country that have taken an interest in the manufacturing of aeronautic motors. I know that it has been done from patriotic motives, and not because they expected to have a profitable business thereby. They have given their best talent and plenty of money to it. In one case, to my knowledge, they have been at it for a year and have not been successful, because the development of an efficient aeronautic motor is a very difficult problem to be solved and requires the best scientific knowledge.

As Mr. Souther says, extreme lightness is desirable, but it is questionable how far you will be able to accomplish it. I have always said we would like to get as light a motor as possible. I do not think we should tie you down to a given weight, but we do not want to let you loose on that, because we then come to the problem of lifting the weight in a flying machine. A rotary motor will not do because of the inefficiency in consumption of oil and fuel. As Lieutenant Child pointed out, the efficiency of the engine must be counted into the weight.

As regards unreliability of motors, our experience has been that nearly

(*Continued on page* 154)

FOREIGN NEWS

DENMARK

Further details have lately been given out of the attempt to make the Trans-Atlantic flight, which will be tried by Ensign Pollner, a Danish aviator. The seaplane will be built in Denmark by the engineers of the Polytechnic Academy, Copenhagen, and will have two motors of 160 H. P. each. It will carry a fuel supply of two and a half tons.

The young officer plans to start from Copenhagen early in July, 1917, flying directly to the Faroe Islands, and waiting his chance there to take the trip across the ocean. A mechanical engineer by the name of Severinsen will accompany Pollner, who is already busy, in his preparations.

FRANCE

Norman Prince, sergeant in the French army—American Aviation Section—twice decorated for distinguished service, is dead in a hospital on the French front, where he was taken recently.

His family was notified of his death by the French War Office. His father, Mr. Frederick H. Prince, a Boston banker, is ill at his home at Pride's Crossing, but has been told of his son's death.

Word that Norman Prince had been wounded was received in this city only a few days ago and at the time it was believed he was on the road to recovery. It was stated that both his legs were broken, but that he was in no immediate danger.

Dr. Morton Prince, his uncle, was travelling in Europe when he heard of his nephew's injury and hastened to his bedside. He was with him when he died, together with Norman Prince's brother, Frederick Prince, who is studying aviation at the French Aviation School.

Norman Prince was the last of five prominent young Americans who volunteered their services to France to remain in that country. They were Messrs. Rockwell, Chapman, Carleton and Thaw, the latter being sent home with a wounded arm and Carleton because of his shattered nerves. Mr. Prince was home on a short furlough the latter part of last year and passed Christmas with his family.

Norman Prince was born at Hamilton, Mass., in 1887, and was graduated from Harvard in 1911. When he decided to enter the French Aviation Corps he was practicing law in Chicago.

GERMANY

In reply to a French publication which recently printed a list of eleven French aviators who up to the middle of September had brought down four or more hostile aeroplanes, the *Norddeutsche Zeitung* today gives the names of seven German fliers who destroyed ten or more aeroplanes and twenty-two who destroyed four or more.

The list is headed by Captain Boelke, whose record of twenty-eight on October 1 has since been increased to thirty, and contains the names of the late Lieutenant Immelmann, with fifteen machines; the late Lieutenant Wintgens, eighteen; Lieutenant Hohendorf, twelve; Sergeant-Major Frankl, eleven; the late Lieutenant Mulzer, ten, and Lieutenant Buddeke, ten—a total of 106 for the seven men.

The French and British lost 130 aeroplanes last month on the Western front, as compared with twenty-one lost by the Germans, the War Office announced today. The statement says:

"We lost in September twenty aeroplanes in aerial battles. One machine is missing. French and British losses amount to ninety-seven in aerial battles, twenty-six shot down from earth and seven which landed involuntarily within our lines. Of this total, those brought down within our lines and within those of the enemy were about equal in number."

GREAT BRITAIN

The following law has been recently passed which seems to be of interest. "If a munitions worker (as defined by the Munitions of War (Amendment) Act 1916), is, on or after October 1st, 1916, killed or injured by hostile aircraft, or by the measures taken to combat them, whilst upon the premises of the factory in which he is employed, and if the injured worker or his dependents on proceeding under the Workmen's Compensation Act, 1916, fail to recover compensation, His Majesty's Government undertake to pay compensation on the scale of the act.

The appointment of Mr. Henry Fowler to the position of Superintendent of the Royal Aircraft Factory has proved to be highly gratifying to the English people as a whole. Mr. Fowler is best known to the English public as the former Chief Mechanical Engineer of the Midland Railway. He is known as an authority on internal combustion engines, as he was very active in the early days of the automobile, greatly assisting in many of the early trials.

He has been acting as Director of Production since the formation of the Ministry of Munitions, and thus will bring to his new position a great knowledge of organization in addition to his technical ability.

The Government authorities have lately taken over a hotel in London, known as De Keyser's Hotel, for the use of the Royal Flying Corps, and quite a scandal has arisen over the matter. The hotel had not been doing well, and in fact, was in the hands of a receiver at the time.

When the Government took over the place a tentative yearly rent of 19,000 pounds (about $95,000) was agreed upon. All of a sudden the negotiations took a complete turn and the Controller of Supplies said that it would be to the advantage of all concerned if the whole question of compensation should be left to The Defense of the Realm Losses Royal Commission. This latter commission decided that, as the Government had the right to take over any place it wished, "it would be a derogation of those rights to pay any rent whatever!"

The result of this Government confiscation is that neither the share holders in the place nor the debenture holders receive a cent of their money expended.

SWITZERLAND

A German aeroplane which landed near Solothurn because of lack of gasoline was seized by the police and the machine and aviator were interned. Another German aeroplane came down on Swiss territory, near Lake Constance, but succeeded in escaping over the lake to German territory.

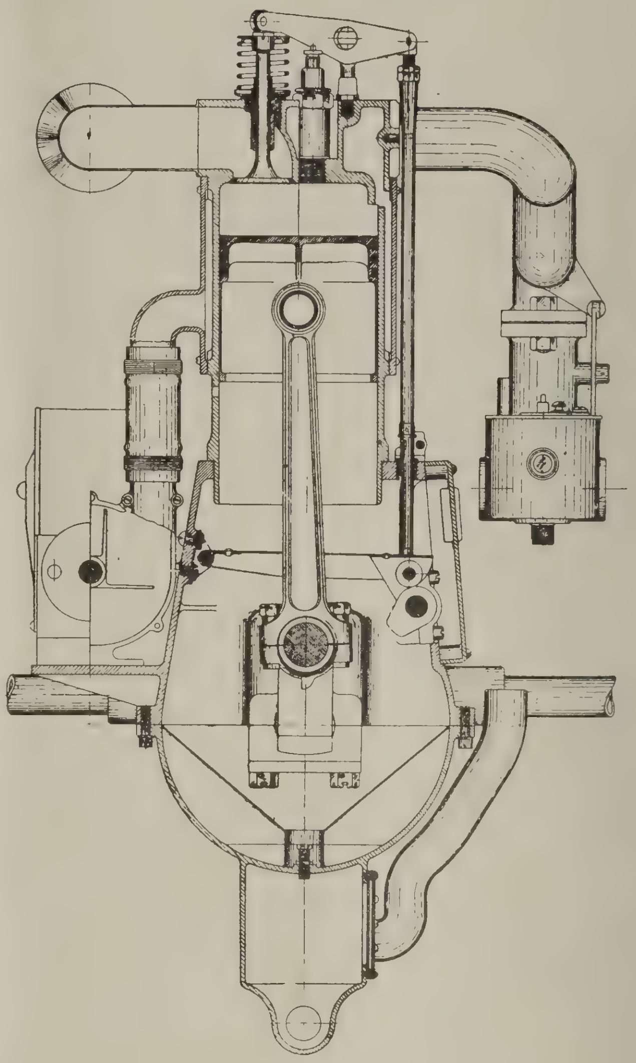
English soldiers digging out an engine of a "Zep," brought down by an English aeroplane, in the last raid over England.

THE NEW 50 HORSEPOWER BEATTY ENGINE

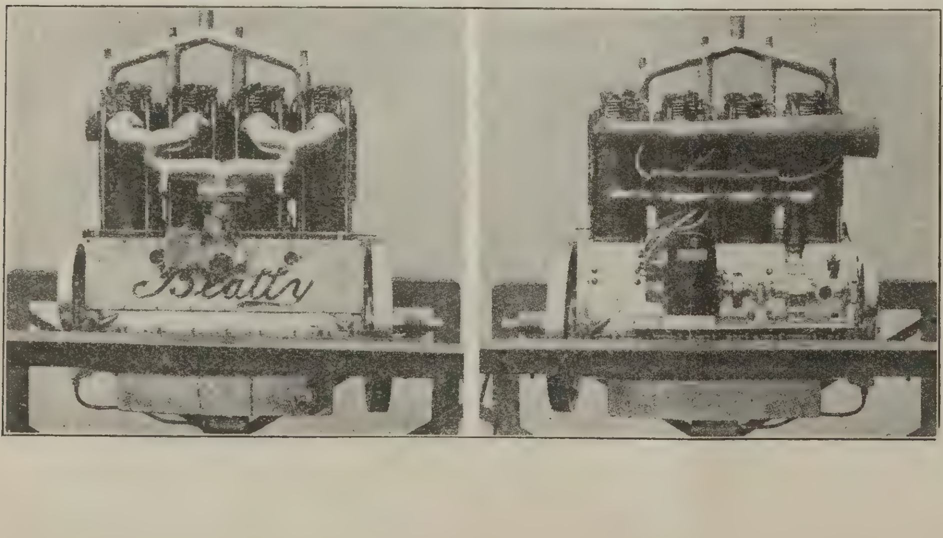
AFTER more than a year of tests and experiments the evolution of the four-cylinder Beatty engine has now reached a stage where its maker is satisfied with its performance, both as regards the power developed and the reliability shown during test runs, on the bench, of more than three hours' duration. In its present form the 50 horsepower Beatty engine differs considerably from the first engine produced in 1914. In the first place the automatic inlet valves with which the older type was fitted have been supplanted by mechanically operated ones, a feature that has undoubtedly been to a very large extent instrumental in helping to raise the power from 40-45 horsepower to 50 horsepower. Inlet as well as exhaust valves are made of nickel steel, and it is only after considerable trouble and expense that a satisfactory valve has been found. The horizontal pressed steel tappet levers, whose object is to relieve the push-rods of all side strain, have been retained. The camshaft rests in bearings on one side of the internal webs of the crankcase, and the cams, which are so shaped as to give very quick lift, are integral with the shaft, which is machined out of a solid bar of steel.

Each of the four cast iron cylinders, which have steel water jackets, shrunk on, is held down by four long bolts passing through lugs on the cylinder head, whereas in the older type the cylinders were secured to the crankcase by short studs passing through a flange at the base of the cylinder. In order to facilitate inspection aluminum crankcase is made in two halves, the lower of which is a thin light shell about ⅛ in. thick, with which is cast integral a small sump having an inspection glass on one side. Both upper and lower half of the crankcase are well webbed for rigidity, the webs in the upper half being cast to form the bearings for the crankshaft, which is a solid chrome nickel steel forging machined all over and running in five bearings. An inspection of the accompanying sketch will give a good idea of the accessibility to both shafts provided by the split crankcase and the detachable inspection cover running the whole length of one side of the upper half of the crankcase. The method of supporting the crankshaft bearings will also be evident from the sketch. The upper half of the bearing is, as has already been said, formed integral with the internal web. The lower half of the bearing cap is also made of aluminum, and underneath it is placed a steel plate, two bolts passing through cap and plate into the web of the upper half securing the bearing. When the lower half of the crankcase is removed the engine can be, if desired, swung right round, and any adjustment to bearings, etc., made with the greatest ease.

On the rear end of the crankshaft is mounted a flywheel —the engine being designed for use on the Beatty-Wright biplanes, which have, as is of course well known, chain drive to the propellers. If it is desired to use the engine on a tractor machine, and direct drive is preferred, provision has been made to incorporate a thrust bearing with the gear wheel on the other end of the crankshaft, the engine being then reversed end to end, so that the flywheel is in the nose of the machine. This adaptability for conversion into direct drive should be of importance in that it enables the engine to be used on ordinary tractor machines, thus considerably widening the scope of its usefulness.

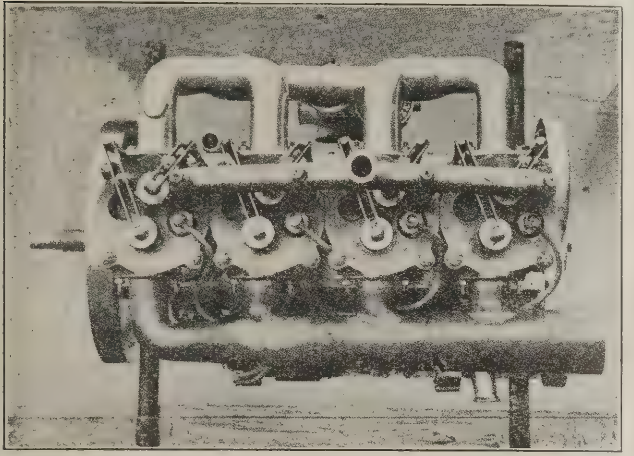


On the front end of the crankshaft—regarding the engine as fitted up for the chain drive—is the spur wheel driving the half time shaft and the magneto and water pump. The two latter are, as will be seen from the illustrations, mounted on a platform on one side of the crankcase, and are driven by a shaft running on ball bearings from the spur wheel on the crankshaft through an intermediate wheel as seen in the end view of the engine. The oil pump, which is of the plunger type, is driven from the crankshaft by means of an eccentric. Running as it does at crankshaft speed, the pump delivers oil at a highly satisfactory rate. In fact, on one occasion when a piece of the gauze in the sump got clogged



The 50 H. P. Beatty Aero Engine

up the pump sucked it into one of the oil leads. The oil is drawn from the sump and passed through a tube running along one side internally in the crankcase. Holes are drilled in this tube at certain intervals in line with each connecting rod, and a constant stream of oil is always being played on the big ends. The lubrication of the small ends and cylinder walls is by splash, which method has been found satisfactory for the engine in question.



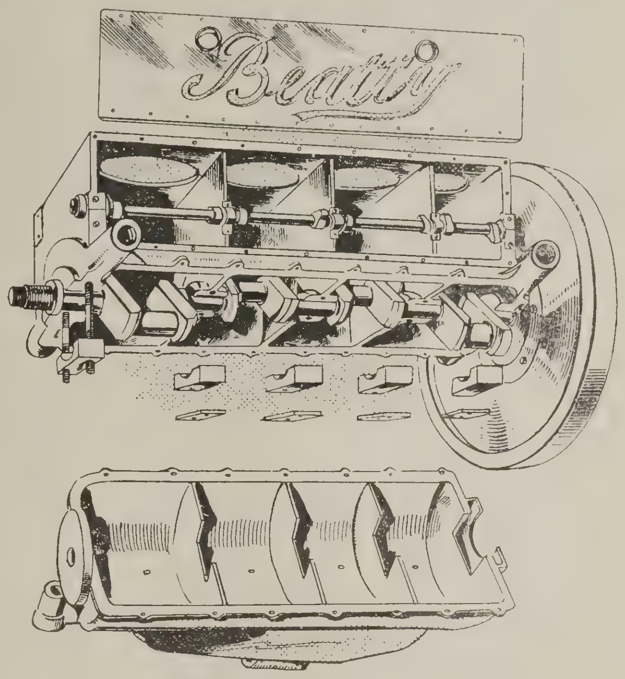
The pistons are of the three ringed type, and are stiffened by internal webs under the piston head. Like the cylinders, they are made of cast iron. Instead of the tubular connecting rods employed in the earlier model, these are in the latest engine made of H section high tensile steel. The big ends are fitted with white metal die cast bearings, while the small ends have phosphor bronze bushes keyed in. The whole engine is supported on four tubes screwed into four arms cast integral with the upper half of the crankcase, thus facilitating alignment.

Although the engine shown in the photographs has separate cylinders, the latest type, which is now on test, has *bloc* castings, and we understand that this type comes out about five lbs lighter than that with separate cylinders.

Also the *monobloc* engine will be even more compact than the present one, since the water leads now projecting some distance above the top of the cylinders will disappear, thus reducing the overall height considerably. As it is, the separate cylinder type has an overall length of 29 inches only, which is quite short for a four-cylinder engine.

A good idea of the *monobloc* engine can be formed from an inspection of the accompanying line drawing, which shows the compactness of the design very well.

A feature which should add very considerably to the usefulness of these engines is that all parts are absolutely interchangeable, as all the machining has been done to jigs and gauges. Mr. W. F. Claxton, who is responsible for the detail work of the design, having made a special point of going round to the various firms manufacturing the parts to check everything during the course of manufacture to make assurance doubly sure.



Altogether Mr. Beatty is to be congratulated upon having produced a reliable engine eminently suitable for school work. The power developed is 50 horsepower at 1,600 r.p.m., and the bore and stroke are 4⅜ ins. and 4½ ins. respectively. The fuel consumption is 4.28 gallons per hour, and the **weight** of the engine complete, but without radiator, **is 248 lbs.**

THE ST. LAWRENCE RIVER A PARADISE FOR FLYING YACHTSMEN

By AUGUSTUS POST

Next season may see flying boats the fashion on the beautiful stretches of clear water in the vicinity of the far-famed Alexandria Bay and among the beautiful summer residences of the Thousand Islands—the Venice of America. Just as the owners of flying boats go south in the winter to Palm Beach and Miama, Florida, so, in the summer time, they will find here an exceptionally suitable place for this latest and greatest sport on the water.

From Lake Ontario, which offers a large body of inland water, where the largest aircraft can navigate with plenty of room, all the way down the St. Lawrence River through the Thousand Islands past the Lachine Rapids and the City of Montreal through some of the most beautiful waterways on the American continent, flying boats can navigate in sheltered waters all the way. Beyond Montreal down past the quaint city of Quebec, the river widens out till it reaches the mouth of the Sagueney River. Here the grandeur of the Sagueney Mountains adds to the beauties of this wonderful river, where some of the wildest and most impressive scenery in the northeastern part of America is to be found; where the rugged mountains meet the estuaries of the sea. In this 762 miles from Toronto to Chicoutimi the "air yachtsmen" will get all the varieties of scenery, great lakes, rapids, mountains and fjords equal to, if not surpassing, those to be found in Sweden and Alaska.

The present mode of travel by steamboat makes it too long a trip for the average traveler, but if the lower St. Lawrence and the Sagueney could be reached in a day's flight, many would be able to make the trip. When large cruising aircraft are more numerous, these cruises might be extended down the Gulf of St. Lawrence by the beautiful Islands of Anticosti and Prince Edward Island to Nova Scotia and from there via Bar Harbor to Boston or New York.

Among the Thousand Islands there are many young men, all familiar with motor boats and high speed engines who are at just the age when aerial training is of the greatest advantage to both themselves and to the country, as they would form a splendid reserve body for the Army and Navy.

Among the many wealthy people there who have all the best things in life, the flying boat will add one more pleasure and add an additional stimulus to the sporting events that are so necessary to keep up the life on the river. The races of the speed motor boats are held every year in connection with the Thousand Islands Yacht Club and some of the fastest motor boats are seen here in competition. It seems only a very short step from these speed boats to the flying yachts of the very near future.

It has been estimated that within the next three years there should be at least 200 flying boats in this immediate vicinity.

MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz

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The Question of Weight in Scientific Model Building

In building scientific models we take first of all the question of *weight.* An item of paramount importance in model areoplaning, theoretically, because in the case of models they do not, as a rule, fly fast enough to possess a high weight-carrying capacity.

Suppose, for example, you increase the area of the supporting surface—you thereby increase the resistance (also the weight) and, in consequence, diminish the speed—you may as a result require more power, which again means more weight, and so on.

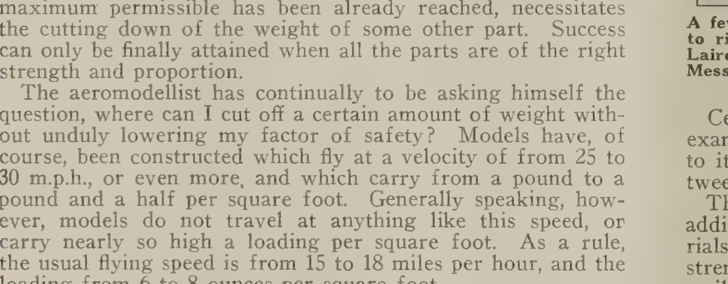
It is no uncommon thing for the difficulty of getting a machine light enough to accomplish some allotted task, to necessitate the re-making of the entire machine several times. More especially, of course, if the builder be a comparative novice at the art. Supposing the machine to be in full working order, and something gives way, this part has to be strengthened. This means additional weight, and if the total maximum permissible has been already reached, necessitates the cutting down of the weight of some other part. Success can only be finally attained when all the parts are of the right strength and proportion.

The aeromodellist has continually to be asking himself the question, where can I cut off a certain amount of weight without unduly lowering my factor of safety? Models have, of course, been constructed which fly at a velocity of from 25 to 30 m.p.h., or even more, and which carry from a pound to a pound and a half per square foot. Generally speaking, however, models do not travel at anything like this speed, or carry nearly so high a loading per square foot. As a rule, the usual flying speed is from 15 to 18 miles per hour, and the loading from 6 to 8 ounces per square foot.

Successful models have even been constructed which have a speed of less than 10 m.p.h. But the average is about that stated above. Some of the leading aeromodellists consider the "ideal" loading to be 8 ounces, *i.e.,* half a pound per square foot. Everything, of course, really depends on the purpose for which the model was designed. For observational purposes and purposes of general aerodynamical study a slow flying model is very often an advantage. A slow flying model, exhibiting good stability, is certainly superior to a model of the "projectiloplane" type which owes most of its stability to its speed and speed alone.

How can we obtain maximum strength with minimum weight?

1. By a knowledge of materials.
2. By a knowledge of how to combine these materials in the most efficient and skilful manner.



A scientifically constructed model of the Nieuport monoplane, constructed by Linden Bates, of the Milwaukee Model Aero Club.

A few members of the Illinois Model Aero Club. Reading from left to right: Messrs. Cook, Lathrop, Zadwick, Lucas, Hitt, McDonald, Laird (the aviator of the Club), Hamlin and Hittle. Bottom row: Messrs. Schweitzer and Sprague. This photograph was taken at the new flying field, Ashburn, Illinois.

Certain materials are obviously unsuitable, such as lead for example (save as a balance weight), not of necessity owing to its weight *per se,* but owning to the relation existing between its weight and its strength, etc.

The lightness absolutely essential to success necessitates, in addition to skilful building and best disposition of the materials, the use of materials of no undue weight relative to their strength; of considerable elasticity, and especially of large resilience, *i.e.,* capacity to absorb shock without injury. It is also an obvious conclusion that it may not be best to use the same substance for different parts of the machine—in certain places the forces are in tension and can be adequately provided for by the use of steel wires, etc., obviously useless where the forces are in compression. One of the great arts in model aeroplaning consists in so designing your machine that the forces in tension shall be a maximum and those in compression a minimum; generally speaking, the "ties" or "tension struts" on a model present little difficulty, it is the "compression struts" which require skilful building. A strut naturally tends to bend when transmitting a push, or compressive pull (example, the motor-rod carrying the rubber) if it be long, and will break unless great care is taken to keep it straight (by means, say, of kingposts and wires in tension).

In order to obtain the maximum strength with minimum weight no better method can be adopted than *the constant use of a good pair of scales.* Note (in writing) the weight (in ounces) of every trial and experiment in the alteration and change of material used. We would say—not only weigh everything—but weigh every bit of everything—were it possible. The writer knows of more than one instance where even an expert aeromodellist desiring to build a machine of a certain weight (10-oz. say) has found when the model is half built that the weight will come out at 11 ozs. or even 12 ozs. The design has then been abandoned and a fresh one commenced. Now had the designer carefully and accurately weighed *samples* of the materials he intended to use before commencing to build, he would have known that the total weight of the model would have exceeded the allotted 10 ozs., and would not have wasted his time in finding out by the rough method of trial and error something which he ought to have found out by more scientific means. It pays to be scientific—your models *may* not fly any better *in the end*—but the end is reached by easier, less expensive and less troublesome means.

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Death From the Air, or the Raid of the Zeppelins

By R. E. deCastro

[There is no doubt but that the coming literature will consist largely of stories of the air. As Jules Verne portrayed a future romance under the sea, which future is now history, we have determined to be the Jules Verne of our time, and blaze the trail for the literature of the future. We shall accept our honors modestly, when our name shall rank with the rankest of the rank. Our masterpiece follows]:

ON the night of Septober 37th, a fleet of one hundred and eighty Zeppelins, three hundred aeroplanes and eight kite balloons set out for the outskirts of London. The aircraft had a hard time keeping up with the furious pace set by the kite balloons, which have proved to be very speedy and deadly in their attacks.

At about eight minutes after a quarter to two, the captain of one of the kite balloons, laying aside his bottle of Pilsner, emitted three "Hochs" and a "Prosit," meaning that London had been sighted.

At once feverish activity took place on the five hundred odd (very odd) aircraft which were following. All lights were dimmed on the ships, and naught could be heard but the sonorous snoring of a few of the crew who had attended a German beer festival the night before, and were naturally tired, poor things! Slowly the ships descended until they were hardly more than ten or twenty feet above the tops of the hotels. (They say that English hotels are very high in holiday season.) The snoring of the crew drowned out the sound of the motors, and the simple Londoners thought the sound was but that of some people sleeping on the floor above. The airships halted for a while, while the members of the crew looked at an open air movie show which was going on below.

The scene which lay below the raiders was one of unsurpassed beauty, and as the grim, gray engines of death hovered above the city, a sigh shook the manly frame of the noble commander of the fleet, Admiral Rudolph Von Eofeniffenoffen.

Ah, it seemed a pity that he had to ruthlessly slay those thousands of Englishmen whom he loved so dearly. As he gazed downward, a tear came into his eye, crept down his cheek and mingled with the beer in his mustache. He looked, fascinated by the ever-changing panorama below him. Beautifully gowned women were alighting from splendid automobiles and Fords on the arms (and feet) of their escorts, while pickpockets mingled joyously with the crowds snatching watches and Ingersolls from the protruding vests of slightly inebriated clubmen. Blue helmeted policemen were bustling to and fro gently caressing the heads of the pickpockets with lead-weighted billies while separating them from their ill-gotten gains. (Their gains were the policemen's losses.) Ah, yes, the scene was one of beauty, and the noble Admiral struggled with himself—that is to say, fought back the emotions which were rapidly undermining his usual strength of mind. But at last checking himself by taking a draught of his Pilsner, and forcing back these debilitating impulses, he stood up to his glorious height of four feet two.

"'Tis well," he said, "for them to enjoy themselves in this manner, but there is work to be done. The Kaiser expects every man to make his mark in battle. One Mark for one death, six for five." The War Cry of the Kaiser instinctively came to his lips and he repeated it o'er and o'er: "Me und Gott!" Then a stern look came over his classic countenance. He rushed to the guns.

"FIRE!" he shouted.

"Where?" cried the crew as they ran for the extinguishers.

Sweeping ten of them aside with one blow of his beer-laden breath, he shouted again:

"THE BOMBS, YOU BUMS!" he said.

"Looks like the Admiral is sober," whispered one of the crew as he ran off in all directions.

In a second a loud explosion rent the air.

"Bang, bang," and also "Biff" and "Bing," said the guns as they hurtled death and ruin on the people below.

And then, —— in a trice all was changed. Where beauty and laughter had reigned before, all was now consternation —dread—black horror. (Of course horror is not really black, but it sounds better that way.)

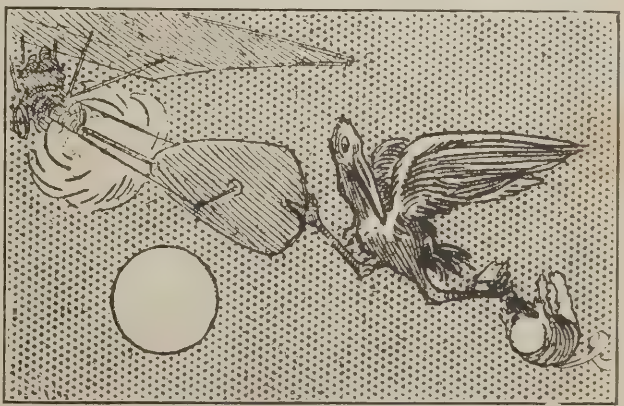
People ran hither and thither, to and fro, and then came back different ways. The noble police, brave to the core—it was a corps of police—shouted encouragement to the seething populace as they—the police—ran for shelter. The anti-aircraft guns began to open fire. The intense crackling of the guns sounded like bottles of champagne being opened on New Year's Eve.

We cannot describe the scene further. Tears well up into our eyes and we sob aloud at the thought of innocent women and children being made the mere bagatelles of the power lust of their rulers.

Then as a pall—(Pall Mall) of smoke hung over the ruined city the raiders prepared to leave. With the kite balloons leading they set out for Germany. All that were missing from their ranks were a couple of cylinders on one of the engines, so with the consciousness of work well done they were soon lost in innocent sleep.

The next day in London, although there were no actual deaths, the entire police force were found at the different hospitals, having their feet fixed. The poor souls were never accustomed to running so fast.

(Next week, if we can think it up, we shall present the story of Great Britain's revenge, so that no one can accuse us of un-neutrality. Just at the present time, we have not a single thought, so if any of our readers can supply the material for one perfectly good, unused revenge, we shall submit it to the War Department and split the commission fifty-fifty.)



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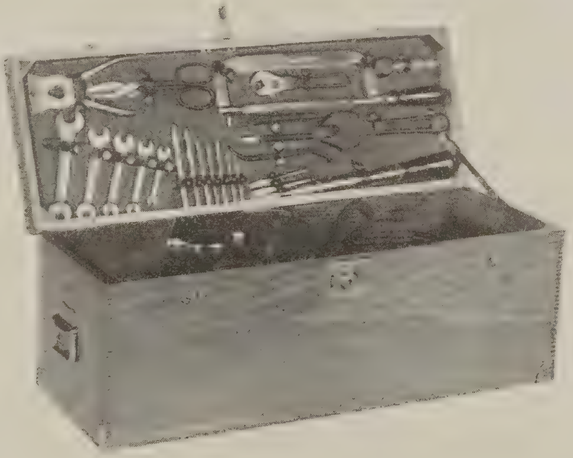

A Pilot's Necessity

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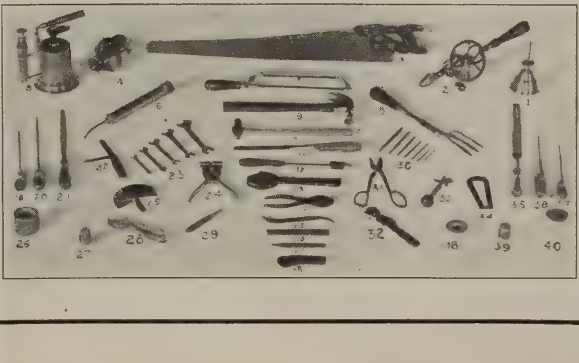

(*Continued from page* 142)

two to five commissioned officers of the Regular Army of the United States, or of regular and reserve officers of the Signal Corps, including at least one and not more than two medical officers; at least one officer of the Regular Army will serve on each board. This board will be appointed on the recommendation of the officer in charge of the Aviation Section of the Signal Corps of the Army.

Each applicant will be subjected to the same physical examination as is required of officers of the Regular Army applying for aviation duty. Applicants will not be examined mentally, but the equivalent of a college education will be required. The examinating board will consider documentary evidence submitted by the applicant. It may seek additional information by practical tests, personal questions, or by procuring additional documentary evidence. Flying ability will be given first consideration, noted and reported in the proceedings of the board. No applicant for a commission as an officer of the Aviation Section, Signal Officers' Reserve Corps, will be considered proficient until he is able to pass the flying test for reserve military aviator, unless specially excepted for reasons stated by the officer in charge of the Aviation Section, Signal Corps, of the Army.

After the required examination the proceedings of the board will be forwarded to the headquarters of the convening authority, with the recommendations of the board as to the qualifications of the applicant. The officer in charge of the Aviation Section, Signal Corps of the Army, shall recommend to the Adjutant-General the grade in which each candidate should be commissioned. After appointment by the President, the Adjutant-General will issue the commission. The commissions of the officers of the Officers' Reserve Corps will be in force for a period of five years, unless sooner terminated at the discretion of the President. Such officers may be recommissioned either in the same or higher grades for successive periods of five years, subject to such examination as may be prescribed.

In time of actual or threatened hostilities officers of the Officers' Reserve Corps are subject to such duty as the President may prescribe. Heads of staff corps when authorized by the Secretary of War may order reserve officers to duty for periods not to exceed fifteen days a year.

The civilian aviation school will be one approved by the officer in charge of the Aviation Section. The manufacturers' schools shall receive $500 for aviation student who qualifies for the preliminary flying test. The test to be conducted by an officer or agent of the Aviation Section of the Signal Corps. For any aviation student who qualifies as a reserve military aviator upon graduation from a civilian school an additional $300 will be paid to such a school. Upon the candidate satisfactorily passing the reserve military aviator's test he will receive a commission as an officer in the Aviation Section, Signal Officers' Reserve Corps, without further examination.

Requirements for Civilian Aviation Schools

1. **Field.**—The field should be of sufficient size and shape to permit of landing and getting away in at least two different directions under normal conditions. The ground must be fairly level and free from obstructions of all kinds. These requisites will be determined on inspection by an officer or agent of the Aviation Section of the Signal Corps.

2. **Training Machines.**—The training machines will comply with the specifications prescribed by the Aviation Section for the preliminary and advanced training types. These specifications will be furnished all civilian schools who instruct students for the Government, or desire to do so. (See Aerial Age for August 21, 1916.

3. **Instructors.**—Instructors must be men of experience in flying and thoroughly competent to teach through the reserve military aviator stage. They should be level-headed, have goon judgment and sufficient mental balance to impart what they know.

4. **Character of Instruction.**—The course of instruction will be divided into two stages. The first stage will include instruction and qualification through and to include the preliminary flying test. This test will be held under the supervision of an officer or agent of the Aviation Section of the Signal Corps. The second stage, which is optional with the school authorities, will consist of advanced training necessary to qualify an aviation student as a reserve military aviator. An advanced training type of machine will be used at least during the last stages of this instruction. Detailed information as to the course to be followed in this stage will be furnished the school authorities. The reserve military aviator test will be held under the supervision of an officer or agent of the Aviation Section of the Signal Corps.

5. **Preliminary Flying Test.**—(a) Three sets of figure eights around pylons 1,600 feet apart. In making turns

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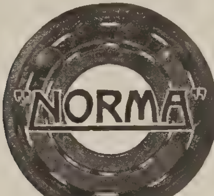

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around pylons all parts of machine will be kept within a circle whose radius is 800 feet.

(b) Stop motor at a minimum height of 300 feet and land, causing machine to come to rest within 150 feet of a previously designated point.

(c) An altitude test consisting of rising to a minimum height of 1,000 feet.

(d) Glides with motor throttled, changing direction 90 degrees to right and left.

Note.—(a) and (b) may be executed in one flight; (c) and (d) in one flight. The same rules apply to starting from and landing on water. Special attention will be paid to the character of landings made.

Should any aviation student desire to take the pilot license test prescribed by the Aero Club of America, every facility will be offered for him to do so.

Report of these tests will be submitted to the officer in charge of the Aviation Section, with the information as to whether or not the school will complete training of the aviator through the reserve military aviator stage.

Reserve Military Aviator Tests

6. Reserve military aviator test will be as follows:

(a) Climb out of a field 2,000 feet square and attain 500 feet altitude, keeping all parts of machine inside of square during climb.

(b) Glides at normal angle with motor throttled. Spirals to right and left. Change of direction in gliding.

(c) At 1,000 feet cut off motor and land within 200 feet of a previously designated point.

(d) Land over an assumed obstacle ten feet high and come to rest within 1,500 feet from same.

(e) Cross-country triangular flight of thirty miles, passing over two previously designated points. Minimum altitude 2,500 feet.

(f) Straightaway cross-country flight of thirty miles. Landing to be made at designated destination. Both outward and return flight at minimum altitude of 2,500 feet.

(g) Fly for forty-five minutes at an altitude of 4,000 feet.

Pay for Tuition

7. Pay for tuition. Upon the student passing the preliminary flying test satisfactorily, the school will be paid $500. If the student is continued under instruction until he satisfactorily passes the reserve military aviator test, an additional $300 will be paid the school.

8. All candidates for the Aviation Section, Signal Officers' Reserve Corps, will be required to pass the prescribed physical examination, must weigh not more than 190 pounds, stripped, must furnish evidence of having a college education and be of good moral character.

9. Applicants for commission as a reserve officer who hold the pilot certificate from the Aero Club of America will, after successfully undergoing the prescribed physical examination, be given a flying examination embodying at least the requirements of the preliminary flying test. If competent, he may also take the reserve military aviator's test.

If the preliminary flying test is passed satisfactorily and the candidate qualifies in other respects, he will be eligible for further instruction to qualify as a reserve military aviator.

If, in addition to the preliminary flying test the candidate also passes the reserve military aviator's test satisfactorily, he will be given a commission in the Aviation Section, Signal Reserve Corps, provided all other qualifications are fulfilled.

(*Continued from page* 146)

everything about the motors has broken at some time or other. It is not any one thing. We have communicated with designers and fliers. In some cases—not in all cases—we have found that this magneto problem has not been corrected, and the gas leads that have been broken time and time again have not been corrected. The wiring proposition is another fault that has not been corrected. Vibration of the motor causes the breakage of many parts, but the breakage of parts is not altogether due to vibration. In other words, we have two problems: To make the parts so that they will stand the proper vibration, and then make the vibration what it should be. The vibration is not what it should be, but that is only one problem, for the parts are not properly designed.

It seems to me if we could only get our scientific designers interested in the aeronautic motor, we could build just as good a motor as anybody else in the world. We have not a motor in this country suitable for aeronautic use. The principal fault with our motors, in one word, is that they are unreliable. That is the first and main trouble. The second is we cannot get enough power out of our motors for naval use. An aeroplane that we are going to take to sea with us must not weigh less than six thousand pounds, and the motors we have are not large enough to carry that weight. We must have three or four hundred horsepower at least. We can get that from two motors of from 150 to 200 horsepower each, but there is not such a motor in the United States at the present time that is reliable. What I am greatly interested in, is not so much the details of designing, but to get the scientific men of this country, who are interested in motor design, busy, and they will work out the details, making each part equal to the work it has to do, having regard to its weight and strength and quality of material. That is the only way, gentlemen, that you are going to get an aeronautic motor in my opinion. If we can get the scientific motor men back of us, we will get a motor.

(*To be continued*)

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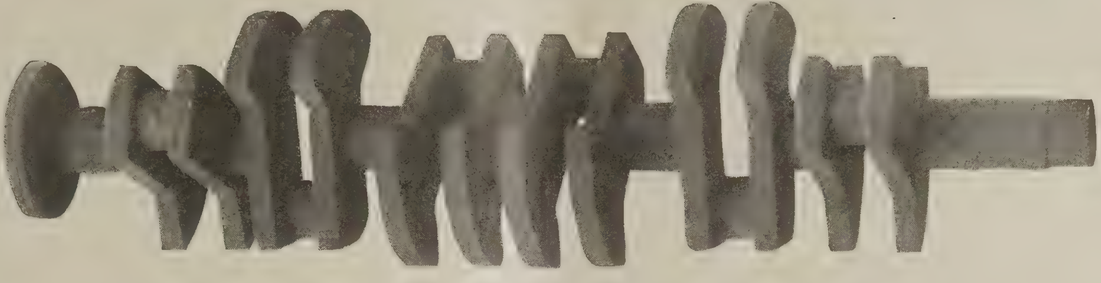

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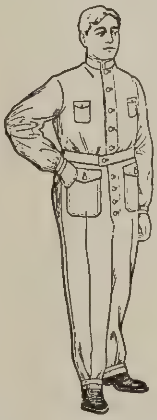

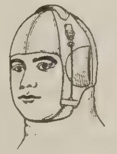

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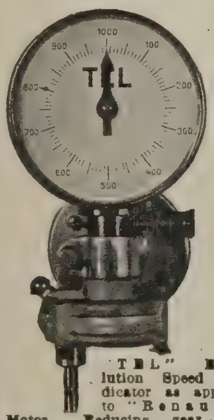

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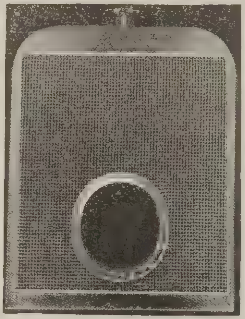

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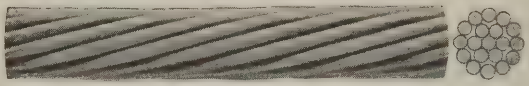

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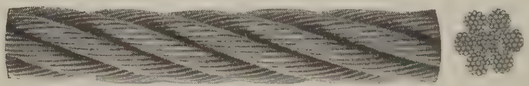

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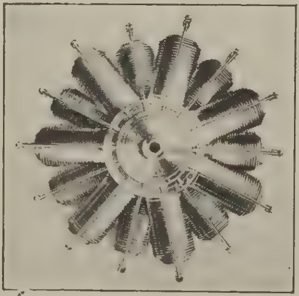

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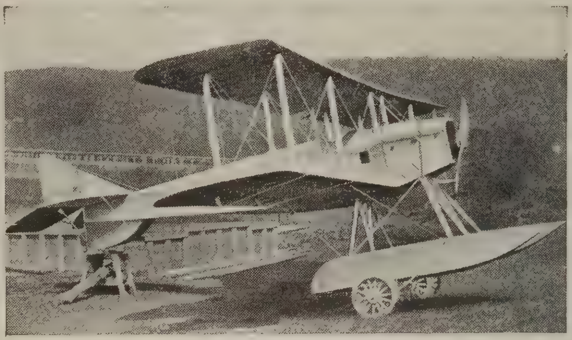

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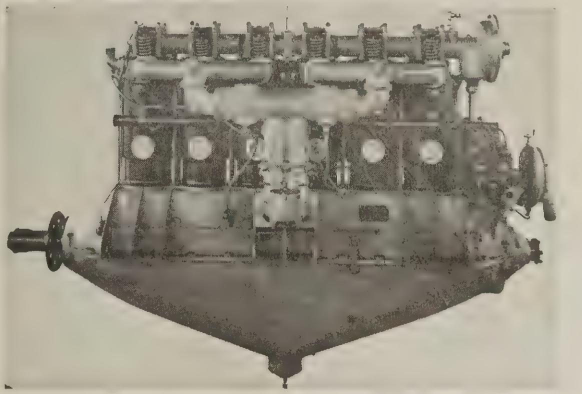

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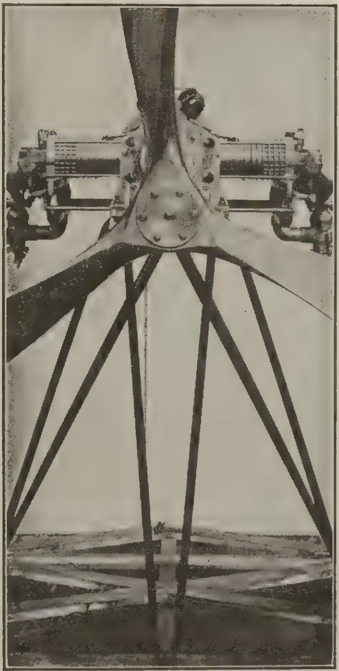

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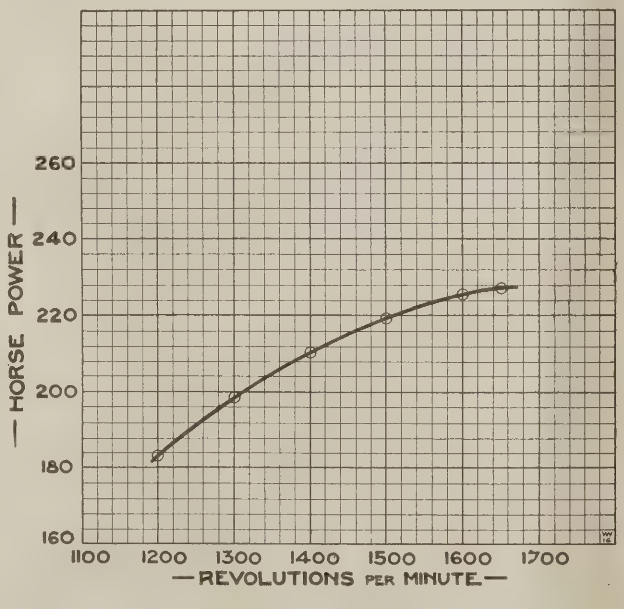

Duration of Test (Minutes)	.60
Average R. P. M	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	210.26
Maximum Observed Horse Power	210.50
Minimum Observed Horse Power	208.10
Total Gas Consumption (Lbs)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. Per H. P. Hour)	.528
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	.844
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

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WEEKLY

VOL. 4, No. 7 OCTOBER 30, 1916 10 CENTS A COPY

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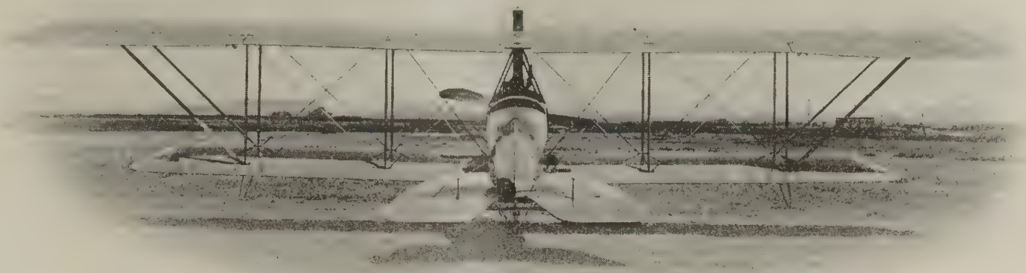

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> Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

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AERIAL AGE
WEEKLY

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VOL. IV NEW YORK, OCTOBER 30, 1916 No. 7

BUILDING OUR AERIAL DEFENSES

REPRESENTATIVE MURRAY HULBERT, of the Twenty-first Congressional district of New York, called on the officers of the Aero Club of America upon his return from Washington and brought additional details regarding the arrangements to develop aviation in connection with both our land and naval defenses. Mr. Hulbert, who is a member of the Aero Club of America and of the National Aerial Coast Patrol Commission, was one of the strongest spokesmen for aerial defense in Congress during the last session, and it was he who proposed the amendment to the Army Appropriation Bill increasing the appropriation ofr aeronautics in the army, National Guard and Aerial Reserve Corps to $14,000,000.

Congress has made available in this year's national defense bills $13,881,666, for army aviation, and $3,500,000 for naval aviation, an aggregate of $17,381,666. The aviation section of the Signal Corps, commanded by Lieut. Col. George O. Squier, has ordered 175 aeroplanes for the army, and soon wil lorder 100 hydroaeroplanes and 100 training-school machines to be used in training the army and the National Guard.

The Navy Department has just let contracts for forty-nine seaplanes. It has twenty-six other seaplanes under construction, besides a dirigible balloon, the D-1, and two new kite balloons, making a total of seventy-eight aircraft units. At present the navy's aviation equipment consists of only six seaplanes, a kite balloon, and two captive balloons. Other orders are to be let by the navy for aircraft, including seaplanes and a dirigible, to cost about $500,000 with its hangar.

Lieut. Col. Squier has signed orders for the formation at San Antonio of two new aero squadrons for the army, and for the purchase of the complete equipment for them. Major Benjamin D. Foulois, who is in command of the First Aero Squadron at Columbus, N. M., will organize the new Second and Third Aero Squadrons at San Antonio. The cost of their equipment will be approximately $1,600,000. Orders have been signed for the purchase of twenty-four motor tractor aeroplanes for these two squadrons. At the same time Lieut. Col. Squier signed an order for the purchase of seventy-five aeroplanes for the army's flying schools at San Diego, Chicago, and Mineola, and in the next few weeks will sign the order for 100 hydroaeroplanes.

Under the National Defense act and the Army and Navy Appropriation acts 2,028 officers and men of both services may be utilized for aviation purposes, of whom 148 officers and 1,200 enlisted men will be allotted to the army and 150 officers and 350 enlisted men to the navy, in addition to thirty acting ensigns to be appointed from civil life, as well as 150 student fliers to be appointed from civil life in the next five years. At present the navy has twenty-nine officers assigned as naval aviators, fourteen officers assigned under instruction as such, and 120 enlisted men detailed. The army has forty-five junior military aviators, with a tactical staff of six officers, and has thirty-eight officers under instruction at San Diego, where they have been turned out at the average rate of eight a month.

The orders just given for aeroplanes and seaplanes call for construction work in more than a dozen factories. Military and naval authorities hope these orders will give great impetus to the development of aviation manufacturing facilities throughout the country and reult in marked improvement in the types of flying machines.

The 49 seaplanes for which contracts have just been let by the navy comprise thirty training-school aeroplanes of the Curtiss type, six Sturtevant seaplanes, three school aeroplanes to be built by the Standard Company, three school seaplanes by the Thomas Company, 3 school seaplanes by the Aero Marine Company, two twin-engine aeroplanes by the Thomas Company, and two seaplanes of a foreign type. Contracts have been let to the Goodyear Tire and Rubber Company of Akron, Ohio, for two kite balloons.

At the time of the passage of the Naval bill there were twenty-six seaplanes of eight different types under construction for the navy. Delivery of all is overdue from a month to twenty-two months. An officer of the navy to-day said part of the delay was legitimate and due to developments. These orders were given to companies to encourage them to undertake the development of a satisfactory seaplane. Once this type has been found and proved to be the best, large orders for machines can be given.

The Navy Department itself has built at the Washington Navy Yard an aeroplane designed by officers, and known as the A. H.-18, which has made a trial flight. In the trial of the various types, native, foreign, and its own models, the Naval Flying Corps will study the performances of all in competition.

Major Charles de F. Chandler of the Signal Corps, who has had practical experience in ballooning, has been placed in charge of all military balloon work, and bids have been advertised for four army balloons, two spherical and two kite. The balloon section may be established at Omaha or at Akron.

The army will train officers in flying at San Diego, where it has eleven training machines which are to be increased by eighteen hydroaeroplanes. There are six machines at the Mineola training school on Long Island, and twelve under order for use there. There are four machines at the Chicago training station and twelve ordered. The army bill appropriated $300,000 for purchase of land in California for aviation school purposes and $300,000 for another large tract. A special board is now considering the selection of the second site in the East.

The army has only one thoroughly equipped aero squadron. It is at Columbus, N. M., and has twelve 160-horse-power reconnoissance type of Curtiss aeroplanes, one Curtiss twin-tractor of 200 horsepower. The army also has one aero company stationed in the Philippines for coast defense work. It will be raised to aero squadron strength.

The officers of the club were pleased at Mr. Hulbert's statement that the order issued by the War Department on September 8 limiting the number of National Guardsmen to be trained in aviation to fifty had been superceded by an order removing all limitations, and that steps were being taken to train the number of National Guardsmen needed to form the twelve aero squadrons for the twelve militia divisions. The organizing of these twelve militia aero squadrons is necessary because the National Defense act allows only 143 aviators to the regular army, and that is a small number considering that half a dozen other countries have between 2,000 and 9,000 aviators each.

Mr. Patrick Y. Alexander, the British aeronautical authority and scientist, who left New York yesterday on board the steamship Orduna, stated that the British Royal Flying Corps has 7,000 aviators in service and several thousand more under training. The aviators, mechanics, assistants, manufacturers of aeroplanes and aeronautical equipment, Mr. Alexander stated, form a round total of about 500,000 people who are working in and for the British Flying Corps.

The Aero Club of America pledged itself some months ago to concentrate every effort until the United States has one thousand trained aviators at its disposal, and has been working energetically toward that end, and as a result it received during the past year applications for training in aviation from one thousand National and two thousand civilians, which it turned over to the Aviation Section of the War Department.

Mr. Hulbert told the Aero Club officers that he had seen Secretary of War Baker and other authorities regarding the aeronautical situation, and they had assured him that energetic steps were now being taken to get and train the personnel needed for a substantial air service. The fact that the order limiting the number of National Guardsmen to be trained in aviation had been superseded and that besides the three aviation centers at San Diego, Chicago and Mineola, steps will be taken to establish other centers in different parts of the country, were accepted by officers of the Aero Club as being concrete evidence that the War Department is going ahead with a substantial campaign.

Mr. Alan R. Hawley, president of the Aero Club, who himself was a veteran balloonist, expressed special interest in the fact that steps are being taken to organize a lighter than air section, which will have dirigibles, kite balloons and spherical balloons. In Europe they are using thousands of kite balloons; they have one at every few miles along every front just a few miles in the rear of the fighting lines, where observers are kept watching developments.

The United States has only one kite balloon, and the lack of these balloons to assist in the operations along the Mexican border was greatly felt, as there were constant rumors of Mexican forces preparing only a few miles across the border, but there were no means to scan the country to ascertain the truth. Kite balloons and aeroplanes would have made it possible to find out the exact conditions.

Rear Admiral Bradley A. Fiske, U. S. N., who was at the Aero Club of America when Representative Hulbert delivered his message to the Aero Club of America, was glad to hear of the steps being taken to develop the naval air service. Admiral Fiske expressed his hope that steps would be taken in the near future to establish a naval aviation station in each of the thirteen naval districts. He indicated that England has to-day more than one hundred aviation stations on the British Island, besides several stations in Ireland, and that it is the extensive aeronautical organization that prevents the German from making the British Isle a daily target for their aircraft.

Murray Hulbert's Candidacy

(*Editorial in New York Times*)

MURRAY HULBERT, candidate of the Democrats and the Independence League for re-election to Congress in the Twenty-first District, which comprises parts of Manhattan and the Bronx, has served his district and the city well in the present Congress. His energy has been of great value also to the whole nation, for it was largely through his instrumentality that the appropriation for military aviation was increased from $3,000,000 to $13,281,666. He not only made the motion which prevailed in the House of Representatives to increase the original pitifully small appropriation, but he worked with an enthusiastic belief in the urgency of the cause to impress upon the Senators, who were at first disinclined to make so large an appropriation for aeronautics, the great importance of that branch of modern military service.

It is a curious fact that Mr. Hulbert is the first member of the House of Representatives from this city ever appointed to the Rivers and Harbors Committee. As a member of that committee he worked with vigor and success to secure much needed improvements at the Port of New York. The provision for the deepening of the East River channel to the Navy Yard and the Hudson River survey are due to his sincere interest in the welfare of the city. Mr. Hulbert should be re-elected, but in order to secure his return to Congress it will be necessary for all the voters in his district who value good service, and believe that a man who has served their interests so well should be retained in office, to use their influence. He is strongly opposed.

THE BRITISH WRIGHT CO.'S ACTION REGARDING THE WRIGHT PATENT

THE current issue of *The Aeroplane* (London) contains the letter from Mr. Griffith Brewer, the Managing Director of the British Wright Co., Ltd., part of which was cabled to this country recently and gave rise to the report that the Wrights had presented the Wright patent to the British Government. The letter which is in answer to a communication from the editor of the *Aeroplane* to Mr. Brewer asking him to state the official policy of the British Wright Company, past, present and future, is as follows:

"Your letter asking me to let you have a forecast of the British Wright Company's attitude to the trade after the war shows that my statement on this subject in the Wilbur Wright Lecture was too Balfourian. I will now endeavor to call a spade a spade, and let you know just where we all are.

"Wilbur and Orville Wright have always looked on England, the home of their ancestry, as the most-favored nation. The invention which developed from their summer outdoor sport and scientific experiments at home in the winter had to be exploited on the Continent by commercial companies, but in America they were able to look after the invention themselves. They refused many tempting offers of company flotation of the British patent, simply because they did not feel that an ordinary speculative company would control the invention in the best interests of aviation. Wilbur used to tell me that they intended to commence working over here themselves, and they would no doubt have done so had their American patent not been attacked so cruelly in the States.

"Wilbur and Orville made warm friendships in England, and many of those friends are indebted to those gifted brothers for considerable mental development by that friendly association. After Wilbur died, Orville had to bear all the responsibility of the Wright Company in America, so I suggested to him that he should entrust his friends over here with his British patent in order that they might obtain recognition for the work done by his brother and himself. I returned to England with this permission, and discussed with Alec Ogilvie (now Squadron-Commander R.N.—Ed.) how we could do this with the least disturbance to the aviation industry. We wanted to obtain recognition for the Wrights, but we did not want to enrich the lawyers at the expense of the struggling aeroplane industry.

"We therefore brought a few of the Wright's friends together, including Frank McClean, T. P. Searight, Percy Grace, and Maurice Egerton (now respectively Squadron-Commander R.N., Captain A.S.C, Captain R.F.C., and Major of Yeomantry attd. R.F.C.—Ed.), and we formed the British Wright Company.

"After obtaining the Government consent, an action was commenced in the Courts against the War Office for infringement of the patent. The sum claimed was £25,000, this sum appearing to us the smallest compatible with real recognition.

"As in the case of most law actions, the hearing was delayed, but it would have come into court within two years—i. e., before the end of 1914—had the war not intervened.

"When the war was declared, the directors of the British Wright Company met, and discussed how they could get rid of the action, because they all wanted to help the Government, and it was felt that the action might prejudice their freedom. An offer was made to accept £75,000 in settlement, and this was accepted by the Treasury, for past, present, and future use of the patent on all Government machines.

"This settlement left the company with the patent rights for sporting use and for manufacture for export to foreign countries. The directors decided, however, not to worry the aviation industry now that their object had been attained, and so with regard to the past no application has been made to any manufacturer for royalty, and so far as I am aware no application ever will be made for the past use of the patent.

"I cannot, however, bind the British Wright Company in any way, because some past infringer might publicly assert that he did not recognize the validity of the Wright patent, and never had and never would do so. My fellow directors are generous men, and in these circumstances they would like to retain the privilege of according satisfaction to the manufacturer who desired to test the question of validity in the Courts. A writ for infringement may, therefore, still be obtained by any infringer on application.

"With regard to your question as to the future, I think I can give you all the assurance you desire. Unless an extension of the patent be granted, the ordinary fourteen years' monopoly will run out on March 23rd, 1917.

"With the consent of Mr. Orville Wright, the British Wright Company will not apply for the extension, so every manufacturer in England will, from March 23rd next, be free to manufacture without payment of any royalty.

"Recognition of the greatest invention within living memory has been secured without disturbing the aeroplane industry, and the surviving patentee has practically presented his life's work as a gift to the British Nation. May they use it for the extinction of those exponents of Kultur who are dropping their emblems on these shores.

"Before closing this letter I should like to asknowledge the powerful disinterested support extended by Lord Northcliffe, who has always taken a keen interest in the uphill fight of the Wright Brothers, and who, when he learnt of the generous terms of settlement accorded to the British Nation, wrote to say how nobly Orville had behaved.

"I think you will endorse this view, because you recognized, when the terms of the Government settlement were announced two years ago, the power secured by this official recognition, and you pointed out to me what a disastrous effect this might have on the aviation industry if the British Wright Company were not moderate in their demands. It is, therefore, to be hoped that the spontaneous views expressed by Lord Northcliffe and yourself will be shared by all who now learn these facts for the first time.—Yours very sincerely,

(Signed) "Griffith Brewer,
"Managing Director of the British Wright Co., Ltd."

THE NEWS OF THE WEEK

Aeronautics' Course at Washington University

A new, fully equipped research laboratory in aerodynamics, having as its purpose the advancement of the scientific aspects of aeronautics, is to be presented to the University of Washington by W. E. Boeing, Seattle capitalist, aeroplane enthusiast and sportsman.

The laboratory will be one of three of its kind in the United States and will consist principally of a steel-lined wind tunnel about six feet square and seventy-five feet long. Within the tunnel will be placed the most delicate scientific instruments, capable of measuring a difference of pressure of one-ten-thousandth of a pound.

The movement at the university inaugurated by the endowment of this laboratory is regarded by President Suzzallo as exceedingly important for the Puget Sound region, where the Government has centred its defense operations for the Northwest.

No one in the Northwest is as greatly interested in developing aviation as a sport as well as a serious instrument for national defense as Mr. Boeing. He has worked for a long time, as quietly as possible, in the direction of upbuilding the science of aeronautics. Since organizing the Northwest Aero Club he has constructed a big workshop and hangar on Lake Union, purchased a $10,000 Martin seaplane, recently abandoned, and has since completed two new hydroaeroplanes. Last June he successfully launched the big hydroaeroplane Mallard. Early in September Mr. Boeing, in conjunction with Capt. R. E. Coontz, of the navy yard at Bremerton, and Lieut. Col. J. B. Cavanaugh, U. S. A., corps of engineering, and Charles H. Bebb laid the matter before President Suzzallo. After several preliminary conferences a more formal meeting was arranged in which President Suzzallo, Mr. Boeing, Prof. E. O. Eastwood, of the department of engineering, and a number of others interested in the project participated.

The new laboratory will be housed in one of the buildings of the engineering group as shown on the permanent plans of the campus adopted by the regents a year ago.

Garden City Notes

Civilian and National Guard pilots at Garden City were in flight continually on Sunday afternoon, October 22nd; various pilots going up until it began to grow dark. The crowd's attention was divided, for the most part, between Blair Thaw's sharp spirals close to the ground and Tex Millman in the J. A. C. Biplane. Fred Hild tok up the new Eastern Aeroplane Company's tractor, Blakely flew a new L. W. F., while the Standard Tractor made several flights.

The machine piloted by Blakely is of the monocoque type and is the most recent addition to the Garden City collection of aircraft. A special hangar was constructed for it. On a trip in which Mr. Lowe, of the L. W. F. Company was a passenger, the machine showed great climbing abilities in addition to a speed of ninety miles an hour. The workmanship of the L. W. F. attracted a great deal of attention. Drawings and a description of the machine appeared in the May 22nd issue of AERIAL AGE and an article on its construction details on June 26th.

Flights were made with the Curtiss "T77," a machine equipped with a wireless apparatus having the aerial running along the upper leading edge, and from the wing tips to the tail.

At one time there were six machines in the air; three Curtiss, the L. W. F., J. A. C. and the Standard, while the exclamations of the spectators that "There goes another one!" became more frequent as each new machine took the air. Many of the amateur photographers twisted themselves into knots trying to get a picture of all the machines at once.

The Chicago-New York Flight

Probably by the time this issue reaches our readers Victor Carlstrom will have flown from Chicago to New York. At the moment of going to press the machine has been expressed from Buffalo to Chicago and everything is in readiness for the trial. A tremendous amount of interest has been evinced in the flight by aeronautical experts all over the country, and the outcome is awaited with more than ordinary anticipation.

Curtiss Company Establishes Temporary Factory on Mexican Border

The Curtiss company has established near General Pershing's headquarters a temporary factory, which has been making all sorts of propeller experiments. This, of course, could not be done with an army on the move. Propeller trouble then would have to be cured by mechanics attached to the aviation squadron.

Other plans have been tried. Propellers have been made of metal. They proved incapable of great speed. Then a blade carved from a single block of wood was tried. The heat warped the wood. Metal caps were placed upon the ends of the propellers to prevent the stiff sage brush from injuring the blades during landing. But this did not prevent warping.

The factory is now making propellers from local wood. This, of course, will not warp, as it was seasoned in the climate in which it will be used. Considerable success has been attained by this plan. But the wood splinters easily.

Export of Aeroplanes

Since our last report, the export of aeroplanes and parts have been as follows: to great Britain, $39,634; to Honduras, $108; to Cuba, $12. Total $39,754.

Members of the Franco-American Aviation Corps at Buc. From left to right, upper row: Dolan, Bridgman, Johnson, Brigadier Boal, Court, Chatcoff, Mair. Seated: Aten, Appleton, Barclay and Maglay. We are indebted to Mrs. Franklin Adams for the photograph.

Aeroplane Bids Opened

Bids were opened by the Army Signal Corps, Washington, D. C., at 11.30 a. m., October 12, for aeroplanes, as follows:

The Patterson Aeroplane Co., Detroit, Mich.:

Lots of	Without Motors	Lots of	Without Motors
6	$5,000.00 each	12	$3,500.00 each
9	4,250.00 each	18	2,750.00 each

The New York Aero Construction Co., New York City:

Lots of	With Motors	Lots of	Without Motors
6	$9,250.00 each	6	$6,550.00 each
9	9,125.00 each	9	6,425.00 each
12	8,975.00 each	12	6,275.00 each
18	8,800.00 each	18	6,100.00 each

Aeromarine Eng. & Sales Company, New York City:

Lots of	With Motors	Lots of	Without Motors
6	$9,000.00 each	6	$5,620.00 each
9	8,750.00 each	9	5,370.00 each
12	8,500.00 each	12	5,120.00 each
18	8,250.00 each	18	5,000.00 each

The Curtiss Aeroplane Company, Buffalo, N. Y.:

Lots of	With Motors	Lots of	With Motors
6	$8,500.00 each	12	$8,000.00 each
9	8,250.00 each	18	8,000.00 each

The Eastern Aeroplane Co., Brooklyn, N. Y.:

Lots of	With Motors	Lots of	Without Motors
6	$7,400.00 each	6	$4,900.00 each
9	7,300.00 each	9	4,800.00 each
12	7,200.00 each	12	4,700.00 each
18	7,000.00 each	18	4,500.00 each

The Heinrich Aeroplane Company, New York City:

Lots of	Without Motors	Lots of	Without Motors
6	$4,500.00 each	12	$4,350.00 each
9	4,400.00 each	18	4,300.00 each

Standard Aero Corporation of N. Y., Plainfield, N. J.:

Lots of	With Motors	Lots of	Without Motors
6	$8,850.00 each	6	$5,800.00 each
9	8,700.00 each	9	5,700.00 each
12	8,650.00 each	12	5,600.00 each
18	8,550.00 each	18	5,500.00 each

Thomas Brothers Aeroplane Co., Ithaca, N. Y.:

Lots of	With Motors	Lots of	Without Motors
6	$8,200.00 each	6	$5,400.00 each
9	8,100.00 each	9	5,300.00 each
12	8,000.00 each	12	5,200.00 each
18	7,900.00 each	18	5,100.00 each

Sturtevant Aeroplane Co., Boston, Mass.:

Lots of	With Motors	Lots of	With Motors
6	$9,650.00 each	12	$9,500.00 each
9	9,650.00 each	18	9,500.00 each

Wittemann Aircraft Co., New York City:

Lots of	With Motors	Lots of	Without Motors
6	$8,000.00 each	6	$5,000.00 each
9	7,750.00 each	9	4,750.00 each
12	7,500.00 each	12	4,500.00 each
18	7,350.00 each	18	4,350.00 each

The Pacific Aero Products Company, Seattle, Washington:

Lots of	With Motors	Lots of	Without Motors
6	$8,100.00 each	6	$5,100.00 each
9	7,900.00 each	9	4,940.00 each
12	7,750.00 each	12	4,790.00 each
18	7,625.00 each	18	4,675.00 each

U. S. Army Issues Specifications for Twin Motored Battleplanes

The Aviation Section has issued specifications for twin-motored battleplanes, and will soon invite bids for 6, 12, 24, 48, and 96 twin-motored battleplanes. Specifications can be secured from Lieut. Col. George O. Squier, Aviation Section, Signal Corps, Washington, D. C.

Army and Navy Orders

Col. Samuel Reber, Sig. Corps, office chief sig. officer, on expiration present leave of absence, to Chicago as sig. officer Central Dept.

Following first lieutenants detailed to fill vacancies in Sig. Corps: Henry W. Hall, 3d Cav.; Eugene A. Lohman, 4th Cav.; Elkin L. Franklin, 13th Cav.; Herman Erlenkotter, 1st F. A.; Harold C. Vanderveer, 9th F. A.; William C. Crane, Jr., F. A.; Herbert R. Odell, 7th F. A.; John E. McMahon, Jr., F. A.; Richard E. Anderson, 8th F. A.; John E. Hatch, F. A.; Neil G. Finch, 2d F. A.; George F. N. Dailey, 13th Inf.; John H. Hinemon, 22d Inf.; Charles H. Corlett, 30th Inf.; Lloyd R. Fredendall, 2d Inf.; Roy H. Coles, Inf.; Roy M. Jones, 1st Inf.; Charles N. Sawyer, 30th Inf.; Ira T. Wyche, 30th Inf.; Octave De Carre, C. A.; Walter Smith, C. A.

Capt. Charles De F. Chandler, Sig. Corps, to duty in office Chief Sig. Officer, Washington.

First Lt. Leo A. Walton, Cav., to Fort Sam Houston for examination for detail in aviation section. Signal Corps.

Campaigning by Aeroplane

In the last Texas primaries J. E. Porter, of Waco, used an aeroplane to do a large part of his canvassing. He gives $3,200 as the expense of operating the aeroplane.

Aero Club to be Founded at Yale

Frederick Trubee Davison, of New York City, who, with a party of Yale friends, made the trip by aeroplane to Chapel at Yale from Glen Cove, L. I., recently, is the leading spirit in a new aero club to be formed at Yale. It is planned to have a course of instruction for amateur airmen.

Assembling department activity at the Hall-Scott Motor Car Co., at San Francisco, Calif.

Patrick T. Alexander Praises American Aircraft

Patrick T. Alexander, the eminent British aeronautic authority, dropped into the Aero Club of America last week just long enough to greet a few old friends, and to record his ever-increasing belief in the vast possibilities of aerial transportation.

Mr. Alexander eight years ago offered a prize to encourage the developing of better aeroplane motors, the first prize ever offered for that purpose, and he has kept in close touch with aeronautics in the different countries ever since the early days when Langley, Chanute, the Wright brothers and other pioneers were only making their gliding experiments.

In the course of an interview with a New York *Herald* reporter, Mr. Alexander said, among other things:

"I believe Great Britain is spending close to £50,000,000, or $250,000,000, in aeronautics this year and is spending more money on American aeroplanes and aeronautic motors than the United States Government. Our orders have given America a valuable start, including designs, the necessary plants and machinery an dthe financial support.

"Some people will probably say that it will be an enormous sum to spend on one branch of our defences. It may seem so, but when you consider your national wealth and what unpreparedness may cost you, you will find that it is only a drop in a bucket.

"The British Government bought the Wright patents, although the life of the Wright patents in England was to last only a short time longer. The American Government should buy the Wright patents, paying a lump sum for them, and let everybody go ahead building aeroplanes. That would be a good boost to American aeronautics. American aeronautics should develop very fast from now on.

"Your Aero Club of America has done most valuable work in developing aeronautics and is responsible for most of the progress that has been made heretofore. I do not know whether the American public appreciates the value of the work that was done by the Aero Club of America in fostering the progress of aeronautics in different ways and in getting Congress to allow $18,000,000 for aerial defence.

"I see that a new movement has been started by the club to develop Pan-American aeronautics and that an aeronautic show is to be held in New York next February. I will surely come for that show, which, for the first time, will bring together the very best American products. We need good aeroplanes and motors everywhere, and as the sources of supply are limited we are looking toward the United States for machines and motors. Therefore, this exposition will be of worldwide interest."

Aero Club of California Has Annual Dinner

The annual dinner of the San Francisco Aero Club was given October 2nd at the Palace Hotel, with 100 of the leaders in the movement to make this city the center of aircraft activity on the Pacific Coast, seated at the tables. Ways and means of arousing San Francisco to the importance of the move and of securing for this city its share of the $15,000,000 appropriation by Congress for aviation purposes, were discussed.

Among the speakers was Captain H. L. Muller, Signal Corps, U. S. A., a noted aviator, who came as the personal and official representative of General Bell. Another was Professor B. W. Wood, of the University of California, who urged that the citizens of San Francisco get to work at once to secure for this city the headquarters of the coast patrol and aviation school to be established by the War Department.

At the conclusion of the banquet William Mayer was unanimously chosen as secretary to succeed C. F. Craig, whose business affairs compel him to resign as secretary of the club.

S. A. E. AERONAUTIC ENGINE DIVISION MEETS

Meetings of the Aeronautic Engine Division of the S. A. E. were held at the Bureau of Standards, Washington, D. C., October 17 and 18.

Dr. Stratton, in his address of welcome, urged that the S. A. E. make full use of the facilities of the Bureau of Standards for tests and research and made a strong plea for the adoption of metric standards wherever possible.

Speaking of standardization in general, he congratulated the society on being in a new field and able to profit by experience in older fields. He stated that co-operation between practical and scientific men is necessary in working out standards and emphasized the value of scientific testing to intelligent standards work. He also urged uniform international units of measure in both scientific and practical fields. He considers the metric system best and believes that a change to that system is not so difficult or expensive as many believe. Dr. Stratton cited the Bureau's work on porcelain in spark plugs as an instance of its value to the aeroplane and automobile industry, determining physical properties of porcelain and investigating refractories. He asked for suggestions for co-operative work by the bureau.

Mr. Ludlow Clayden, chairman of the Standards Committee, presided. Mr. Henry Souther presented a report of the meeting in committee of the Aeronautic Division, the subjects dealt with being as follows: Proportions of Crankshafts; Spark Plug Porcelains; Pipe Fittings for Aeroplanes; Spark Plug Size; Propeller Hub Dimensions; Propeller Hub Locking Fitting; Engine Supports; Specification of Engine Weight; Direction of Engine Rotation; Stresses in Propellers.

Mr. Souther in presenting the report of the Aeronautic Engine Division, stated that the committee recommended that the French propeller hub be adopted as standard, that the dimensions be all in the metric system, except the bolts, nuts and screws, which should be S. A. E. standard; that the 18 m.m. spark plug be accepted as the standard for aero engines; that progress was being made by the committee in the discussion of engine weight as related to horsepower, and as to the matter of standard engine supports. Mr. Souther reported that the Aeronautic Committee had decided to adopt the electrical motor standard concerning engine rotation. Progress was reported in the discussion of pipe fittings. One of the most interesting topics before the committee, said Mr. Souther, was the consideration of propeller stresses. The difficulties on the border, he pointed out, were being eliminated by the manufacture of propellers out of native wood.

Mr. Charles Manly, who has just returned from a trip to the aeronautical factories in Europe, suggested that propeller standards should be postponed. He believed we were on the eve of important changes in this matter. Those present were tremendously interested in the statement which Mr. Manly made to the effect that there were 70,000 uniformed men of the British R. F. C. in France, and that in England and

(*Continued on page* 178)

The delegates who attended the meetings of the various divisions of the S. A. E. at the Bureau of Standards, Washington.

REPORT OF NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

What the Army and Navy Want—Prominent Engineers Discuss Power-Plants

(*Continued from page* 154)

The Chairman. Mr. Manly, you have been interested more or less in the steam motor and other motors; will you give us your impressions?

Statement by Mr. Charles M. Manly of the Curtiss Aeroplane and Motor Corporation.

Mr. Manly. There are a number of points I have noted as we have gone along, especially some of the high points. Going back to Mr. Souther's statement, I think, so far as the building of good, light, reliable motors is concerned, that we are not very much better off, so far as the starting point is concerned, than we were five years ago. In other words, I do not think we have gained a great deal of intrinsic knowledge during the past five years, except what has come up during the war.

We began five years ago, but we did not have the stimulus. The stimulus has been provided to a certain extent by the present war in Europe. But, unless we are going to be able to keep on having enough business to keep the mill grinding, the development is not going to be constant and steady. If the Army and Navy are going to help us, and they have got to help us by giving assurance that the manufacturer is going to be able to produce something that is salable, that is, that there is going to be a market for his product.

The next thing of special interest is the question of manner of approach in the matter of developing the best aviation motor. There are two main ways to approach the subject; one is to start with your motor light weight and by process of evolution make it more and more reliable; the other is to start with your motor very reliable and decrease the weight. The man who starts with his motor very reliable, that is, sacrifices everything to reliability, and then attempts to decrease the weight, is not so apt, I think, to arrive at the mean result of dependability and moderate weight, as the man who starts with his motor light and improves its design. I think he will get there quicker than the man who starts with the motor car motor per se, and tries to develop an aeronautic motor. We find that it is a great deal easier to put on a few pounds than it is to take them off. A number of people come into the factory and show us where we can increase dependability by adding ten per cent in weight, but mighty few come in claiming greater reliability at the same weight, or, still better, greater reliability with less weight.

I figure that the great thing we have needed was stimulus and time. You can not do these things in a hurry, I don't care what the stimulus is. England has had lots of stimulus over there, with the Germans raiding her coasts. It helps some, but you can not do marvels. It takes time for development and for getting the opinions of other people. It is not well for the man who builds the motor to do the testing of it. It has, therefore, got to go to other hands to be thoroughly tested out. If you are trying to manufacture in large quantities, it becomes all the harder to change things, with immense quantities of stuff accumulating all the time. If this stuff is accumulating too fast, it is going to mean an enormous loss, so that he is going to find a way to utilize that and at the same time produce the correct result. If we had the ideal conditions, which would be plenty of time, plenty of motors, and plenty of money, changes would be made with motors much more rapidly than under war conditions, where pressure is necessary to meet contracts to produce the product. Those are the principal points I have had in mind.

The Chairman. Lieutenant Edwards, will you tell us some of your impressions?

Statement by Lieutenant W. A. Edwards, U. S. N.

Lieutenant Edwards. I do not think there is anything I can say that Lieutenant Child has not already told you. We have been working together in the laboratory here at the Navy Yard, and I think he covered all the points in his statement. There is only one thing that he has omitted, and that is the crank shaft trouble, and Mr. Souther brought that out. We have had a good deal of crank shaft trouble.

The Chairman. Mr. Coffin, will you give us some of your experiences and impressions?

Statement by Mr. H. E. Coffin, of the Naval Consulting Board.

Mr. Coffin. A great deal has already been said that has been very much to the point, but it seems to me that there remains a good deal to say on certain phases of this subject not yet touched upon.

In attacking this whole problem of the development of a motor for aircraft work, it seems to me that we should disregard some of the necessities of the immediate moment, and look over the foundations which we must lay for the development of the whole art. We are worried at the moment about the motor truobles we are having. There are certain fundamental difficulties with motors, not only with the aircraft motors, but with the automobile motors as well.

Those of us who have spent our lives in the automobile business, and seen it develop from the very start in 1898, know that after some fifteen, sixteen or seventeen years, we are just beginning to feel that we know something about building a reasonably good gas engine. Therefore, I think we must look a long way farther ahead than next month, or next year, or year after next, for that matter, and that the foundation on which we must base our efforts at motor development must be one of co-operation between the Army, the Navy, the engineers of the country interested in gas engine development, and the manufacturers of aircraft. Now, we can not, any of us, sit in a corner and say that things are bad and refuse to do our just part in bettering the conditions. We must all put our shoulders to the wheel, because the best that all of us together can do will not be any too good.

Now, the motor car art stood still, or rather went, if you like, from bad to worse, until the engineers of the motor car industry began to co-operate. Our difficulties in 1907 and 1908, when we really started quantity production, became not only the difficulties of the individual designer, the individual engineer, and the individual motor car, but they became the problems of an art which had grown very rapidly, and which had suddenly thrown tremendous demands on all of the allied arts. Those demands were so diversified, and there was such a lack of uniformity in the ideas of the automobile engineers who were forcing development in these auxiliary lines, that these men in the accessory arts practically threw up their hands and said: "We are finished. We cannot do anything until you people, yourselves, get together." This resulted, in 1909 and 1910, in the engineers of the industry really getting together for co-operation on the work. They have been working together for the last five or six years. There is no question whatever but that the whole development of the motor car art, not only in an engineering line, but in a commercial way, is based absolutely on the work of the engineers. It would be impossible today for the motor car industry in this country to produce, as it is going to produce this year, something like one million motor cars, except for this close co-operative work in engineering lines.

Now, in this work here in this new aeronautical art we have big engineering problems. Those of us who are here in this room can only hope to help solve them. We can not settle them here today, or in any number of meetings we might hold. These problems must be solved by the co-operative effort of the brains that we can very reasonably hope to bring to bear on these matters. We have probably twenty-five hundred or three thousand men in this country whose attention we can center to a great extent on some phase of this work, and if we get our problems before these men in the proper shape, we are going to find within the next year, or year and a half, a tremendous lot of development in this whole line. This is the fundamental consideration, because in the long run, if we look three or four or five years ahead, this will be the basis on which we will have progressed.

It is possible for any of us to go into our experimental room and build an aviation motor that will probably put up a wonderful performance and have everything down to a hair under extreme specifications. But, when we put that motor into quantity production, then we must compromise with that experimental room product, and must finally arrive at something which shall be a commercial possibility. Many of our model motors which we build are not commercial possibilities. This whole aviation development, from what I know of it, appears to me to be an experimental proposition thus far. There has been practically no real quantity commercial production in that line. We have been trying to build motors which are so near the ragged edge in strength of parts, reliability, lightness, and so forth, that we have gotten into a lot of trouble that we ought to be able to avoid.

I want to tell you for a moment about a movement we now have on foot. The motor car industry as an industry is, without question, going to interest itself with aircraft development. There is no doubt of this coming. Motor car engineers are taking more interest in it every day. Many of the manufacturers are working on aircraft motors partly through patriotic motives, though some of our friends in Congress will say that no such thing exists among business men. A large percentage of men in the aviation field are already members of the organization known as the Society of Automobile Engineers, and a very large percentage of the members of the Society of Automobile Engineers will unquestionably become interested in the aviation field, and will take membership in the Society of Aeronautic Engineers as a matter of course.

Within the last week or ten days a proposition has been advanced which has gained favorable consideration all along the line among the men interested in the various phases of aviation work, for the merging of the gas engine interests in this country, in one strong central organization. That means that the "American Society of Auto-Motive Engineers" (a name Mr. Hawley and Mr. Wise Wood, of the Aero Club of America, suggest), will take over under a four vice-presidential formation, the motor car, aircraft, motor boat and tractor engineering activities and combine them in one strong, active organization for development in the whole gas engine field. If we do not do that, it will mean that most of us will be members of three or four organizations, trying to do duplicate work. Therefore, we have hit on this scheme, and hope to bring immediately into touch the governmental departments represented here today and the engineering and manufacturing personnel in the whole field of gas engine development. It means that we are going to concentrate attention upon these problems and concentrate such action in this diversified line of endeavor as will be a great help to the industry.

I brought here with me today a sample, to show the possibilities of that sort of thing—some of the transaction of the Society of Automobile Engineers—and I desire to pass them around and show you what is not only possible, but what we must achieve in the aircraft industry.

In 1909, for instance, we were having trouble with the specifications for materials—metals, irons, steels, and so forth. Here are two or three reports, one of January, 1911, known as the Report of the Iron and Steel Division, of the Standards Committee, of the Society of Automobile Engineers; and here is a report of January, 1915, of the same committee. There is comprised within these reports probably every steel necessary for the development of the aircraft art, and it is listed not under the name of some special brand of the steel maker, as was the practice five or six years ago, but under the chemical and physical specifications which that steel should show in the hands of the user. Here are two volumes of data sheets which are standards. When I say standards I use the term in the widest meaning. Let me illustrate. Every tire manufacturer in 1908 and 1909 was building a tire which would fit no other manufacturer's rim. In short, a motor vehicle manufacturer, to give the customer any choice, was obliged to carry in stock complete equipment for nearly every tire made on the market. We had to go to the tire manufacturers in general and say to them: "Gentlemen, you must adopt a standard." When you consider that many of these concerns had hundreds of thousands of dollars tied up in molds, and so forth, which must practically go on the scrap heap with the adoption of any new standard, you can appreciate that the problems confronting the aircraft industry are wonderfully simple compared with those of the automobile industry.

Here is one of the monthly bulletins of the Society. It is given up largely to metals. Here is a volume of the transactions just picked out at random, about half of which is given to consideration of aeroplane engines, and here is a volume of the monthly S. A. E. Bulletin for May, 1916.

Now, to go back to the magneto trouble that has been mentioned. There is no excuse for magneto failure on an aeroplane engine, other

(*Continued on page* 178)

FOREIGN NEWS

FRANCE

A report from France a short while ago contained the news that William Thaw, of Pittsburgh, had been killed in aerial combat, but later reports say that he is alive and perfectly well, having left the front on October 19 to attend the funeral of his comrade in the French Aviation Corps, Sergeant Norman Prince, who was killed a short while ago. Prince took part in a great aerial raid and in a combat which followed the raid was wounded in the head. Although wounded he kept up his fire at his adversary, and, when he attempted to land, he struck an aerial cable, a result of his injuries it is thought, and was picked up unconscious.

The Cross of the Legion of Honor was pinned on his breast as he lay dying in the hospital.

On October 20th, ten of the American aviators were at Paris at a luncheon in honor of Dr. Morton Prince, the uncle of Norman Prince. Dr. Prince presented to President Poincaire "the address of the Allied Nations," signed by five hundred Americans.

Noted men of France made reference to Norman Prince, Kiffin Rockwell and Victor Chapman and declared that the men who gave their lives for France would never be forgotten.

GERMANY

The newspaper, *Sporting,* of Paris, has announced that it has heard that Captain Boelke, Germany's most famous aviator, has been severely wounded by a shell from a French anti-aircraft gun. As this is not the first time that Captain Boelke has been reported *hors du combat* we shall have to wait a while before giving credence to the report.

Seventy-four hostile aeroplanes—twenty-one French and fifty-three British—were shot down by the Germans during September, according to a list compiled by the German military authorities, says an Overseas News Agency statement.

"This publication," adds the statement, "is illustrative of the worth of the declaration recently made by Premier Asquith, that the British aeroplanes had gained complete domination of the air. The Entente powers never give precise, detailed reports regarding the successes they claim in aerial warfare."

GREAT BRITAIN

Evidently the more fruitless and costly become the Zeppelin raids on England the greater and more boastful become the promises of the pro-Zeppelinists. Frantic with rage at the loss of so many of his huge pets, Count Zeppelin is reported to have declared he would send a fleet of eighty ships to wreck London.

Whether they awake sooner or later, as the editor of the Stuttgart Beobachter suggests, to the reality of things the German people evidently have still a belief in the promised destruction of London, for which they are waiting with more or less increasing impatience. If not eighty, they will be quite satisfied with a fleet of fifty to do the job.

So says William Lockwood, a Yorkshireman, who, after passing fifty-four of the seventy-four years of his life in Saxony, has been repatriated and restored to his old home at Harden, near Bingle, where he arrived last Saturday.

"This last few months I have heard wounded soldiers say there is no chance for Germany now, that there are so many men and guns against them; but the German people make no secret," he says, "that fifty big Zeppelins are being built expressly for the destruction of London."

While the German Imperial Chancellor, Dr. von Bethmann-Hollweg; the Minister of the Interior, Dr. Helfferich, and the Minister of the Navy, Admiral von Capelle, are still seeking in secret session to dissuade the committee of the Reichstag from further submarine and Zeppelin follies, several of the German newspapers have come to the conclusion that in neither case is the game worth the candle.

Maximilian Harden's weekly review, Die Zukunft, has once more suffered suppression for speaking too openly on these questions, and it is not improbable that other journals will share its fate. These newspapers have put the essence of the matter in a nutshell. Since the British navy began seriously to operate against the undersea menace, two hundred German submarines have been destroyed. On the other hand, out of seven Zeppelins which sought to reach London and failed, four have been destroyed. These are strong arguments for the Imperial Chancellor's anti-frightfulness campaign.

Mr. Patrick Y. Alexander, a prominent British Authority on aeronautics, has recently arrived in the United States, and has made some remarks upon the European War that are of great interest.

"Few people," he says, "understand the meaning of the U-boat coming to the American shores. They do not understand that America is the new world no longer and what the U-boat can do the aeroplane can do faster and easier. In a year you will undoubtedly fly them over to Europe instead of shipping them over."

Mr. Alexander repeats that the Allies have complete superiority in the aerial side of the war. Aeroplanes can be seen in flocks anywhere. Every ship that leaves Britain is escorted by aeroplanes until it is quite a way past the Irish coast. There are in use at the present time in Great Britain hundreds of small dirigibles smaller than three hundred feet long with aeroplane bodies instead of the usual nacelle. They are capable of staying in the air fifty hours and can make a speed of forty miles an hour. They are very useful for coast defense and submarine warfare.

Hundreds of kite balloons are along the entire coast of England. Great Britain is spending about $250,000,000 in aeronautics this year, and is spending more money in American aeroplanes and motors than the United States Government.

JAPAN

Lieutenant K. Higuchi, an Army pilot of the Tokorozawa Aviation Corp, started for a trial flight Sept. 19 at ten oclock, but when he had reached a height of twenty-five hundred meters, his motor suddenly stopped, and he fell to the ground with his machine. He was instantly killed and the aeroplane was smashed.

Lieut. Higuchi became an Army pilot this May, and only four days ago he successfully made the long-distance flight to Ichinomiya and back, a distance of two hundred and fifty miles.

Two new aerodromes, one military and one naval, will be built, according to the Japanese Government. The former will be located at Narashino in Chiba prefecture, and the latter at the seashore at Kagamiga-ura in the Bay of Tateyama. The military air corps is preparing to study a combined action of aeroplanes with cavalry and artillery actions in time of war, but the aerodrome at Tokorozawa lacks conveniences for this purpose, so the authorities have selected grounds at Narashino for the new aerodrome. Sheds are now being made there, and the ground will shortly be opened for service. The naval air corps, too, has felt the necessity of a bigger aerodrome, and found ground along the seashore at Kagamiga-ura in Takeyama bay in Chiba prefecture. The ground there is now being purchased by the naval authorities.

Another aviation disaster occurred at Aomori recently. Sub-Lieutenant Wada of the naval flying corps was making a flight off Kusodomari, Aomori prefecture on No. 4 hydroplane with a reconnoitering officer about 9.30 a. m. When the aviator was about to descend the machine was overtaken by a sudden gust of wind which broke the left wing of the plane. The aviator lost control of the machine and both the pilot and the reconnoitering officer fell headlong into the sea from a height of 60 feet. The reconnoitering officer was safe, but the pilot Sub-Lieutenant Wada could not be found for some time. A search party was got to work at the scene of the disaster and eventually the aviator was picked up badly injured in the right thigh. He was removed to the Aomori hospital, and is expected ot recover in about a month.

CHINA

According to press dispatches from Peking, two American and two German engineers have been engaged by the Chinese Government to establish an aeroplane factory, which will be located in Honan Province.

One of the many Curtiss aeroplanes in use in Europe.

EASTERN MILITARY TRACTOR

EASTERN aeroplanes are designed and constructed according to the specifications of the War Department. They were designed by Mr. Edward F. Marshonet, and constructed under his supervision. After going through tests at Mineola, one of the Eastern tractors was sent last Monday to the Eastern School of Aviation at Sheepshead Bay.

Rapid assembly and disassembly has been given careful consideration. The entire machine can be taken out of crates and set up complete by two men.

All interior woodwork of wings, etc., receive a coat of varnish. All steel work in control area are given two coats of white enamel. Cowls, fittings, etc., receive three coats of grey enamel finish, and are proof against oil and water. Struts, fuselage, fabrics, etc., receive three coats of Sherwin-Williams water and oil proof spar varnish.

The fabric used throughout is a high grade Irish linen, sewed onto the wings, treated with dope and three coats of varnish, giving a high gloss and smooth finish.

General Dimensions

Span, upper plane	39′ 0″
Span, lower plane	30′ 0″
Chord	5′ 6″
Gap	6′ 0″
Length over all	25′ 6″
Motor	120 h.p.
Speed range	75-40 m.p.h.
Climb in ten minutes	3,500 feet

Planes

The main planes are staggered, the entering edge of upper planes being set nine inches further forward than that of the lower. Main planes are also set at a retreating angle of 21 inches from the body, which gives a maximum amount of stability.

Wings are built up in five sections, the four large sections comprise practically the entire lifting surface, the small section fitting over the fuselage.

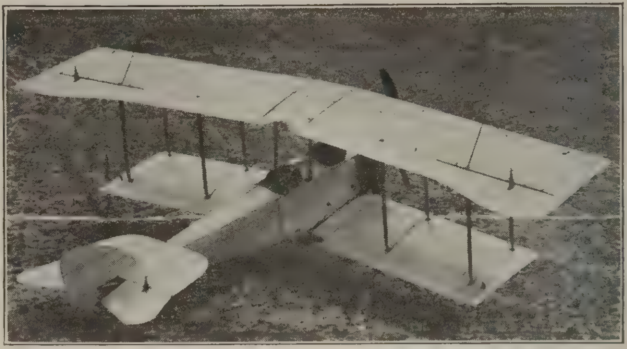
The wing curve is Eiffel No. 36, especially selected so as to have not only a high lift to drift ratio (1 in 20), but also adapted to fast climbing with load (3,500 feet in ten minutes) and of sustaining the machine in flight, fully loaded, at a comparatively low speed. (High speed fully loaded 75 miles per hour, low speed 40 miles per hour.)

All wood used in wing construction is clear spruce, and all beams, ribs, etc., are of the lighest sections possible consistent with the strength required in each member. All ribs are built up in such a way as to assure their perfect alignment, and are proof against warping and also weakening, due to weather conditions.

Wings are reinforced with cross wires. Previous to covering all wood and wires receive a coat of wood filler and one of varnish.

Fuselage

Is built up largely of white ash, longerons tapered for lightness. Fuselage clips are steel, so designed that they do not pierce longerons. Wiring is of steel piano wire and Roebling cable, doubled in the forward section for safety. Fuselage is in two sections, dividing at the rear of the pilot's seat.



Seats provided for two passengers and the pilot. The passengers sit at the center of gravity, so that at all times the machine is balanced properly, whether or not it carries passengers. Special care has been taken to permit both pilot and passenger a good field of vision.

The edges of both cockpit holes are well padded. Padding in cowls and seats is medium grade horse hair, upholstered in a serviceable grade black pantasote. The seating arrangement is comfortable, secure and convenient to access, permitting easy observation and protection at all times against draft. All wires and other obstructions preventing easy access to seats of pilot and passengers have been eliminated. The cowls are constructed of No. 20 gauge aluminum, and reinforced with a 3/16 inch wire around edges.

In front of the pilot's seat is fitted a substantial mahogany dashboard having conveniently arranged thereon, in clear view of the pilot at all times, baragraph, Stewart revolution indicator, clock, inclinometer, Connecticut switch, and American pressure gauge.

The control system used is of the Deperdussin type. The elevating planes are two in number, operated by the push and pull on the steering column. They are constructed of steel tubing and wood ribs, the tubing being used for the hinge edge and trailing edges. The ailerons are two in number, setting in a recess in the top planes, operated by a turn of the wheel. The vertical rudder is of the balance type, and is operated by the feet. The stabilizing plane is constructed of steel and wood.

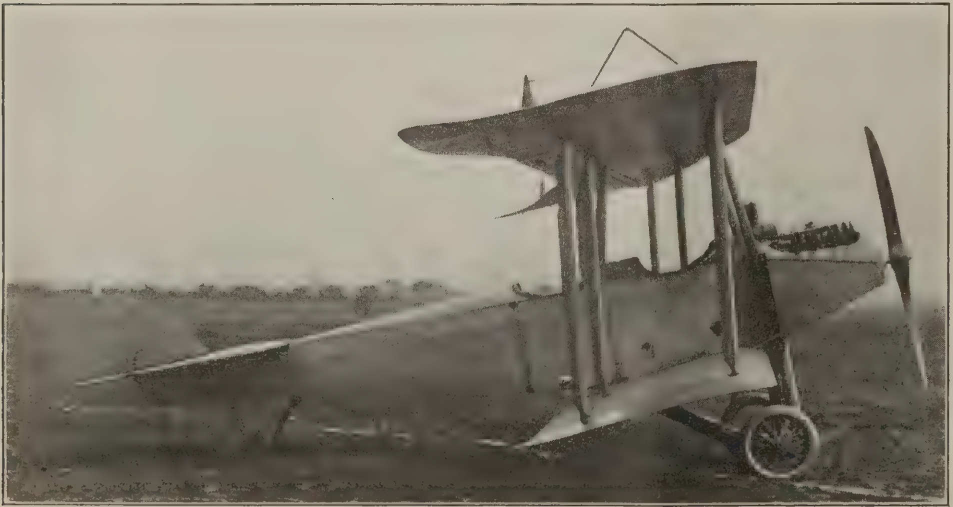
Landing Gear

Is of the two wheel type, having 26 inch by 4 inch wheels and Goodyear tires. The axle is of 1¾ inch chrome nickle steel, which is carried on skids through the medium of Goodyear cord shock absorber. The wheels are constructed with 7 inch hubs and tangental spokes. The tread is 6 ft.

Rattan skids are fastened to the outer extremeties of the lower wings to prevent side-swipes. Owing to the tail skid being mounted on a swivel, the machine will make easy and quick turns to both right and left, and can be driven along a straight course in any direction with respect to a moderate wind. An additional feature of the tail skid construction is the fact that in the event of the wood skid breaking off on account of flaws in the shock absorber or other causes, no damage will come to the tail planes or fuselage, since the steel tube supports of the skids will permit further flights being made through its ability to act as a skid.

Power Plant

One hundred and twenty h.p. 8-cylinder maximotor, mounted on a substantial motor bed carried on steel supports. The front plate is of steel, holding the longitudinal fuselage members, cut out



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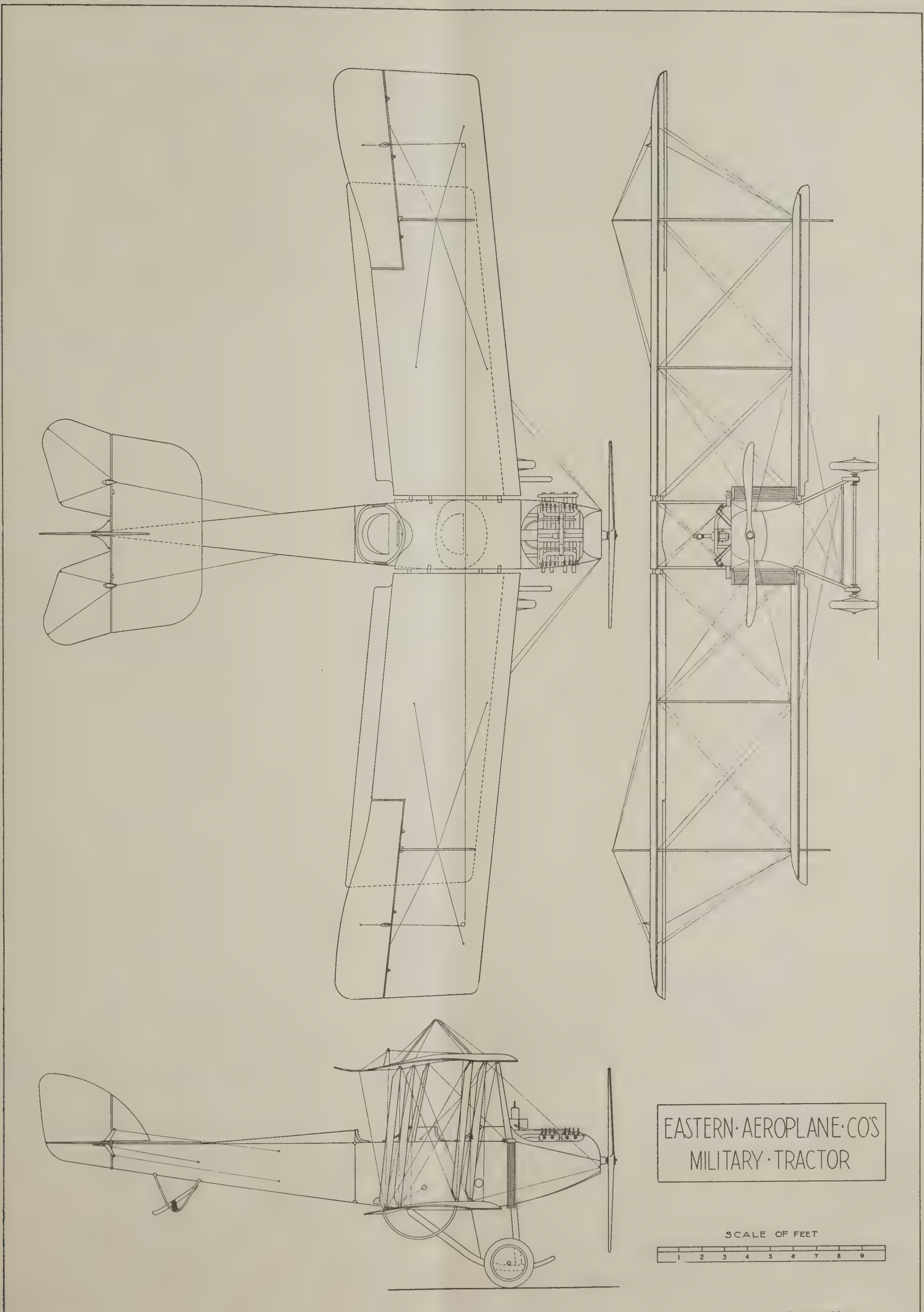

EASTERN·AEROPLANE·CO'S
MILITARY·TRACTOR
SCALE OF FEET
1 2 3 4 5 6 7 8 9
McLaughlin

MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz

CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Some Points About a Model Workshop

By H. Sibley

A decided advantage about model aeroplane building is that the tools required are neither expensive nor many. A small vise, fret-saw, a chisel, a small plane, a hand drill, a soldering-iron, hammer, pair of cutting pliers, and last but not least a small pair of scales, being all that is practically necessary, besides which there is great scope for the inventive faculty, and up to the present there is no hard and fast rule as how to do this or that; it is left to each aeromodellist to work out his own ideas.

This is, to my mind, one of the failings of model clubs: that is the incentive to copy the member's model that performs the best. How often you find that in one club one type predominates, and in another some other. The first necessity in a model workshop is tidiness; there is no excuse for an untidy heap of rubbish, tools, etc., scattered in all directions, model parts lying about the floor, aeronautically speaking, *a bois cassé*. It is a good plan to hang up model parts on the walls, as this will make the walls of the workshop useful, and it will tend to keep the floor from becoming a general rubbish heap. I wonder how many models have finished their career through being accidentally trodden on. I must confess in my early flying days many of my own models suffered in this way.

I now keep my propellers (neatly arranged) on one part of the wall, planes on another part, fuselages on yet another part; if any reader has not tried this method, he does not know how well it improves his workshop.

The workshop should also have its designing department. Personally, I derive much pleasure in always making plans and sketches of every model turned out, and I think that is why so many models are badly constructed; it is due, in the first place, to lack of thought being given to designing and thinking out each part separately. Some of my fellow modellists spend hours in explaining how such a thing is going to be made, when a well drawn plan and a few sketches would show up certain errors, which without such would not have been apparent until much time and labor had been lost.

Plans are also very handy for future reference besides giving one some idea of the work accomplished.

It is advisable always to have a good supply of materials, for it is very irritating, just as you are getting on with the model, to find you lack this or that which for the time being puts an end to your work.

The hydroaeroplane shown in the accompanying photograph was constructed and flown by George Bauer, Aero Science Club.

Hydroaeroplane constructed and flown by Harry Schultz, Aero Science Club. Many excellent flights were made by this model.

It is almost needless to say, always have the best materials that are within reach of your pocket. In this direction it is surprising how many things can be adopted for models from household oddments.

Never skimp the smallest part of your work; the old saying, "The more you put into a thing, the more you will get out of it," applies probably more to the making of model aeroplanes than to anything else.—*Courtesy of "Flight."*

Model News from Muskogee, Okla.

Real Bleriot models that will actually fly are on exhibition in the Fine Arts building. The aeroplanes are the work of two young boys, Frederic Wheatley, 13 years old, and Lee Swindler, 14 years, both of Muskogee, Okla. The boys have a shop in their back yard where they have for some time experimented in the construction of aeroplanes. They have models of many well-known 'planes. The record distance achieved by one of the models in four blocks. The power for the machines is furnished by a clever arrangement of rubber strands.

What Constitutes a Model?

A question which is very often asked is what constitutes a model? A model is either a copy (on a small scale) of a full-sized machine already in existence or a design for a full-sized machine (in a model form) which has not yet actually been built.

If we accept this definition of a model, and scientifically speaking it is the correct one, we at once see that many of the machines flown by more than one club, whatever they may be are not "models" at all.

They have, of course, their uses, and form a necessary stepping-stone to more perfect types. A model should resemble a full-sized aeroplane as regards dimensions as near as circumstances permit, due allowance being made for the use of rubber as the motive power. So far as the real question of freak models is concerned it is certainly not the model which makes 30 secs. to 40 secs. duration which constitutes the freak.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

England Shall Be Avenged

By R. E. deC.

NO, it could not be! Britain's honor could not be left sullied by the memory of the dastardly aerial attack by Admiral Von Eefiniffinoffin and his fleet of aircraft. To submit in silence was to admit defeat. (A true Englishman never admits anything.)

Our hero, Lord Stephen Stewbum, M.P. (Mounted Police), first Earl of Westminster, sat at his window and looked forth through the windows at the scene of desolation below. Where once had been seen activity, now was all desolation and ruin. It was indeed a sad sight to behold, and the Earl was downcast at it. The insult to Britain's honor, the stigma of defeat seemed to cast a shadow of gloom over the handsome face of the Earl. At this point let us describe our hero.

He was well over five feet in height and broad in proportion. He wore his clothes with all the grace and ease of one who never had to worry about the tailor's bill. An intensely black mustache set off the classic pallor of his features, and in one eye—it did not matter which one, the Earl was versatile—he wore a becoming monocle. His suit was a modest light green and across his simple blue vest, checkered with purple squares, and set off by a few designs in lavender, was a watch, which the great Napoleon had given (or lent) to the Earl's ancestor many years before. It will be seen that the Earl was quite simple in his tastes—he was the simplest man for miles around—by our description of his clothing. On his head he wore a brown cap drawn well back from his forehead. It has been stated by some enemies of the Earl that he formerly wore a hat which completely covered his ears, but that on one occasion he was asked to have a drink and did not hear the request so he resolved not to commit such a serious error in the future. Of course, we can not give credence to those malicious reports for they are circulated by those who are jealous of the Earl's attainments.

The Earl's tastes were, as we have remarked, simple. In fact, the family motto which was emblazoned on the escutcheon above his head was just one word, "SIMPLISSIMUS"—a word having its origin far back in the days of Alexander the Great, Alfred the Great, Tom the Great, Bill the Great, Great Guns and Great Scott. But to go on with our story:

The Earl was downcast. The Earl was in deep despair at the thought that a set of men who could not even move in his select circle had bombarded London! He could not conceive it! The affrontery—the very nerve of it! Then the thought ran through the Earl's mind like a flash of lightning. "England must be avenged!"

The servants, who were standing around peeling gold leaf off the picture frames with their knives, looked up. They could not quite comprehend the marvelous thought which had flashed through the brain of the Earl. They had been thinking for three days for some method of retaliating against the Germans but had not the ability to voice their thoughts and here the Earl, with hardly three hours' thought had electrified them (he thought in a flash) with those sublimely magnificent words: "England must be avenged!" The Earl was astounded at his wisdom and was weakened with the truth he had hit upon. In fact, he was so weak that he dropped his "H's" when he again spoke.

Then the thought arose. Who was to bring vengeance on the heads of the Huns? Perish the thought! Who but the Earl who was one of the greatest little avengers that ever came across the pike? Then raising his hands above his head in rage, the look of the cave man came into his eyes and——

(To be continued next week. Be sure and miss it)

Murder!

"Listen!"

"Yes."

"A South African cannibal learned to pilot an aeroplane and took his wife up for a flight. When he came down, she was gone.

"Well?"

"Would you say that the aviator or the radiator?"

(And the stillness of the night was disturbed by the falling of an axe.)

"Bill, I have one more question to ask you."

"All right, get it off your chest."

"If a blind man went up in a flying boat would you say that he could sea-plane?"

(And Bill had the most beautiful flowers at his funeral!)

Listen, son, who put those tattoo marks on your arm?

My father, sir.

Ah! Illustrated by the author!

Used to It

There was once a well-known aviator who was continually getting hurt as the result of his dare-devil exploits on his aeroplane. One day he happened to meet an old friend and told him that if he was ever in town to drop in and see him (the aviator), no matter what time he landed.

So one day the friend came to the aviator's home town, and remembering the aviator's request, looked him up and went to his home.

Arriving at the door, he rang the bell and a woman answered the door.

"Does Smith, the aviator, live here?" he asked.

"Yes," was the answer. "Carry him in and I'll send for the doctor!"

"HOORAY! THIS MUST BE AN AEROPLANE EGG."

Curtiss

JN TWIN MOTORED TRACTOR

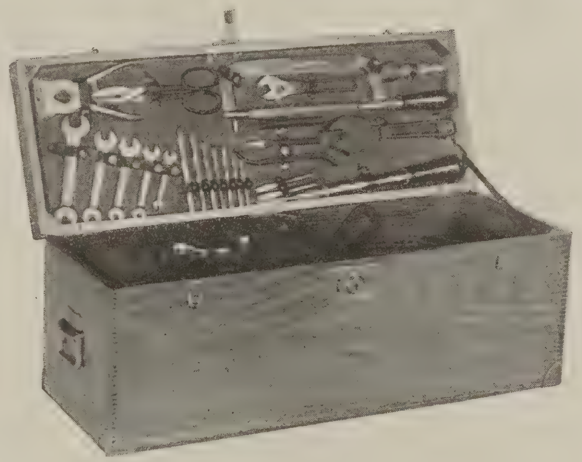
FLIES AND CLIMBS ON ONE MOTOR

A DOUBLE FACTOR OF SAFETY

Against Any Possible Forced Landing Is Gained by This Machine in Its Ability to Climb on One Motor

Recently piloted by Victor Carlstrom 661 miles, when equipped with pontoons, in 8½ hours in flights for the Curtiss Marine Trophy, making greatest mileage for this contest so far recorded.

THE CURTISS AEROPLANE CO.
BUFFALO, N. Y.



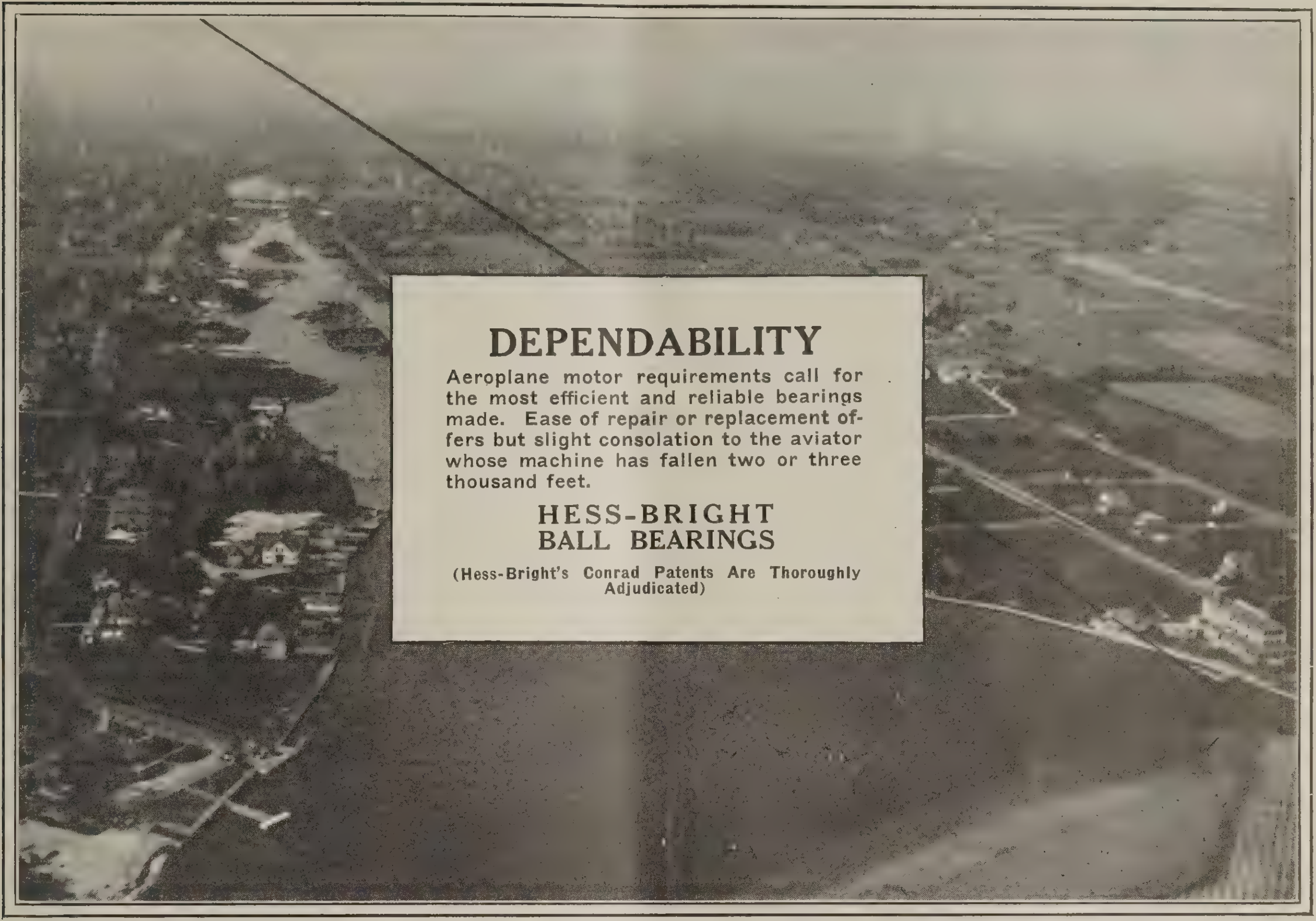
A Pilot's Necessity

THE accompanying illustrations show the compactness and completeness of the Cooper Aeronautical Tool Box. Complete with the assortment of tools shown on the lower diagram the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

After five years of flying experience these tools have been selected to meet every requirement for Aeroplane service. The size of the box is 28 x 9 x 10 inches.

Single Boxes, $100 — Discount on Quantity

The John D. Cooper Aeroplane Co.
BRIDGEPORT, CONN., U. S. A.



DEPENDABILITY

Aeroplane motor requirements call for the most efficient and reliable bearings made. Ease of repair or replacement offers but slight consolation to the aviator whose machine has fallen two or three thousand feet.

HESS-BRIGHT
BALL BEARINGS

(Hess-Bright's Conrad Patents Are Thoroughly Adjudicated)

Personal Paragraphs

Miss Katherine Stinson showed that her biplane had more speed than a number of noted auto racers at the Tri-State Fair, Memphis, Tenn., on September 30.

The first thing that James Owen, of Milwaukee, Wis., did when he received notification the other day of a legacy of $800,000 was to write for information to the Aero Club of America and to manufacturers concerning prices of aeroplanes. He intends to take up aviation as a sport with real interest.

Overton Bounds, instructor at the Army Aviation School at Mineola, raced and vanquished Edmond D. Yost, auto speed king, at the Allentown Fair, September 30. Yost used a 106 power Pathfinder car.

Corporal B. O. Watkins, of Battery C, Birmingham, has been assigned for duty to the U. S. Government Aviation Campaign at Mineola, L. I., to study aviation and aeronautics.

Lester Miller, the Dallas aviator, flew from Hobart to Gotebo on September 21.

Randolph Hall is now with the Thomas Bros. Aeroplane Co., as a draftsman.

Mrs. F. R. Spalding and Miss Helen Brindel made flights with Lieutenant Phil Rader in a Curtiss biplane, September 26.

When Edward Unger's motor failed him at 200 feet he had a narrow escape on September 24 while flying at Oakland, Cal.

Charles Young made daily flights at the Wetumka, Ill., fair, September 27 to 30.

DeLloyd Thompson attracted large crowds at the Peoria District Fair, October 4 to 6.

J. E. Diamond, engineer of the Aluminum Castings Co., Cleveland, Ohio, had his baptismal air flight on October 3, when he made a flight at Buffalo with Phillip Rader, one of the Curtiss instructors.

Pennsylvania News

On September 23rd, Mr. Robert Glendinning, President of the Philadelphia School of Aviation, flew his flying boat from the Essington School waters to the League Island Navy Yard, to personally deliver a pilot's license to Mrs. Robert Lee Russell, wife of the Commandant of the yard. Mrs. Russell has been quietly taking lessons from the instructors of the school and a short time ago passed the required tests necessary in order to obtain an aviator's license.

A great many members of the Club were invited by the Franklin Institute, of Philadelphia, to attend the lectures of October 5th. W. J. Humphreys, Professor of Meteorological Physics, U. S. Weather Bureau at Washington, gave a most interesting and instructive talk on "The Atmosphere and Aviation."

The relation of atmospheric circulation to gravity, temperature contrasts and earth rotation was explained and a brief account given of trade winds, monsoons and cyclones. A practical method of estimating the approximate direction and velocity of the winds one might expect to find at the various flying levels was shown. The phenomena of the atmosphere, which is known as air pockets or holes in the air, was also discussed.

Following the lecture by Professor Humphreys, the Club was most interestingly entertained by a talk on "Efficient Military Air Service," by Colonel George O. Squier.

Robert E. Glendinning, banker aviator and member of the Club, left New York on the steamship Espagne, October 14th, for France, where he will make a short stay, studying the methods used in the aviation schools of that country. Mr. Glendinning will not visit the war lines to see the airmen in action. His object is to see how war aviators are turned out at the schools, what methods are most efficient and to study the work on a large scale. What he learns there it is expected will be of invaluable assistance in the conducting of the Philadelphia School.

Personal Paragraphs

G. K. Brown, 21 years old, of North Bay, Ont., a student aviator at the Wright Aviation School at Hempstead Plains, is believed to be fatally injured as a result of a fall he received while taking a Wright biplane up in a practice flight.

Brown was only about fifteen feet above the field when his machine dipped, one wing hit the ground and he was hurled out on his head. At the Nassau Hospital it was said his skull is fractured.

Captain Willoughby has offered his services to the Navy Department in organizing the "Flying Corps" of the United States Naval Reserve—(Class F of the new Navy Bill just passed).

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Eastern Military Tractor

(*Continued from page* 172)

for the motor. The motor can be readily removed from the frame without the usual disturbances of connections. Convenient access is had at all times to all parts of the motor. The motor is properly shielded by an aluminum hood, hinged for making inspection and adjustments to the motor. Streamline is thus preserved throughout.

A gasoline tank holding 25 gallons, located under the passenger seat, and is fed to the motor through a pressure pump. The tank is fitted with splash plates. Provision has been made for positive and reliable system of pumping gasoline to the motor, reliable and sufficient in all flights up to 45 degrees inclination, either climbing or gliding. The gasoline, oil and water pipes provided have been so installed as to be proof against vibration. A reliable means to prevent backfiring has been provided. An aluminum shield lined with asbestos is also placed between the motor and the passenger's cockpit.

S. A. E. Aeronautic Engine Division Meets

(*Continued from page* 169)

France there were 7,000 aviators attached to the R. F. C. The other services were in proportion, so one can gather how many men are in the air service in Europe.

Mr. Augustus Post intimated to the meeting some of the preliminary plans for the Pan-American Aeronautic Exposition, to be held in Grand Central Palace, February 8-15. The announcement aroused much interest.

Lieut-Col. George O. Squier, in charge of the Aviation Division of the Army, at an appropriate part in the proceedings referred briefly to the plans of the Aviation Section.

The following is a list of those who were present: Robert M. Anderson, D. M. Averill, A. H. Ackerman, B. B. Bachman, C. M. Bunnell, P. F. Bruder, W. M. Britton, David Beecroft, C. E. Barnett, A. G. Batchelder, A. Ludlow Clayden, R. H. Combs, W. H. Conant, J. R. Cautley, H. D. Church, C. H. Clement, H. W. Crane, Clarence Carson, Herbert Chase, Capt. V. E. Clark, F. S. Duesenberg, J. E. Diamond, George W. Dunham, H. C. Dickinson, W. A. Frederick, L. C. Fuller, W. T. Fishleigh, F. M. Germane, B. D. Gray, David L. Gallup, Lester D. Gardner, W. J. Hart, M. C. Horine, Russel Hoopes, H. L. Horning, Russell Huff, J. E. Hale, H. M. Jackson, F. J. Jarosch, Alexander Klemin, T. L. Lee, A. D. Libby, R. McA. Lloyd, R. S. Lane, J. O. Lagorse, Glenn L. Martin, F. E. McCleary, W. E. McKechnie, A. L. McMurtry, C. W. McKinley, J. C. Manternach, A. F. Milbrath, C. M. Manly, Berne Nadall, R. J. Nightingale, H. C. Osburn, W. H. Palmer, Jr.; S. C. Porter, Augustus Post, Rafford Pitt, H. L. Pope, A. L. Riker, Secretary W. C. Redfield, J. M. Rowe, Lieut.-Col. George O. Squier, Dr. S. W. Stratton, J. E. Shaurind, Henry Souther, E. E. Sweet, W. R. Strickland, J. Stagg, Jr.; Herbert C. Snow, J. G. Utz, C. B. Veal, G. Douglas Wardrop, P. L. Wormely, C. B. Williams, E. R. Whitney, F. A. Whitten, J. R. Zmunt.

(*Continued from page* 170)

things being equal. That is, within the magneto itself there should be no failure in ordinary service such as an aeroplane is put to, because an aeroplane is not used so continuously as a motor truck, for instance, which is also fired by a magneto. A great deal of the trouble develops because the magneto is not properly mounted on the motor. No magneto should carry a gear directly on its shaft. We learned that in racing cars in 1906.

The wiring in the average aeroplane is a joke. All wiring must be carried in metal conduits. I think the wiring of an automobile, or the wiring of an aeroplane, should pass examination similar to the underwriters' examination by the insurance companies. You would not think of building a five hundred dollar garage without the underwriters passing on the wiring installation, yet you will spend ten thousand dollars on an aeroplane, and risk your life in it, and not give a damn as to the wiring. (Laughter.)

Extreme lightness I have already mentioned. The question of vibration in a motor gets back to a fundamental which must be corrected before you can correct a lot of the other difficulties which arise. Vibration is, in the last equation, the cause of possibly nine-tenths of the trouble with any apparatus, whether it is a motor car or an aeroplane. The vibration in a gas engine is dependent upon certain fundamentals of its design. The six and the twelve cylinder machines are the only two types of engines which can be in a practical way freed from vibration as they should be. The six cylinder motors have not been as free from vibration as they should be, but we have made a long step forward this year. My own concern, for instance, has spent a great deal of time on this feature alone.

It would very much surprise all of you gentlemen in this room if you would take a six cylinder engine—the nearest thing to a perfect balance in the line of a motor—and drive that engine with an electric motor, so that the engine itself is not run under its own power, at speeds up to two or three thousand revolutions per minute. You would be very much surprised, after you had stripped everything off that engine down to the crank shaft, to find that you had practically the same amount of noise left that you had when you started. This leads us to the conclusion that the principal difficulties in the gas engine are tied up in some way with the crank shaft. And it does not make any difference how heavy we make the shaft. Adding weight to it will probably make the troubles worse. Many light shafts behave very much better in a crank case than a heavy shaft.

(*To be continued*)

Ashburn Activities

By A. E. Nealy

The four Government tractors at Ashburn have had an electric effect upon the Sunday attendance and activities. October the 8th witnessed more visitors to the field than in many weeks past. Among those present were Mr. Chas. Dickinson, President of the Aero Club of Ill., Mr. Art Smith, Mr. Walter Brock, Miss Stinson, Mr. Raoul Hoffmann, Mr. Roth, Mr. Ole Flottorp.

Captain Morrow and Mr. Christie were upon the field entirely occupied with Chicago's aviation enthusiasts. Christie went up in one of the tractors, giving many of Chicagoans their first view of military aviator and machine in flight.

Mr. Charles Arens, with Sinclair as pilot, brought out the little Anzani tractor late in the afternoon, but did not get the machine tuned up till darkness and a heavy wind swept over the field.

Mr. Edward Stinson left Saturday with his mechanicians for the West. He has a number of dates.

Mr. Emil Laird and mechanicians are at present filling dates in Colorado and Arizona.

Chicago News

By Arthur E. Nealy

Attempt is being made to hold "Advertising Day" at the Ashburn field upon the date that Victor Carlstrom starts his contemplated trip between Chicago and New York. The Chicago Advertising Association is enthusiastic over the subject and promises to turn out a large gathering in spite of the poor weather that has gripped the city.

Sunday last there was considerable flying at the field. Army aviators Christie, Eden and McCulloch were up in their Curtiss tractors, and Miss Marjorie Stinson exercised her new tractor to the great enjoyment of the spectators. Especially interesting was the long flight at a considerable altitude made by Christie. Notwithstanding the fact that it was a wet and cloudy day, there was a large number of people upon the field, all of whom were anxious to see flights made by the new aviators and machines upon the field. We informed that eight more army tractors are to be sent to Chicago.

Pilots' Certificates Granted

The following pilot certificates were granted at a meeting of the board of governors of the Aero Club of America, held on October 4, 1916:

No. 595—Louis Bodor, of the Martin School, Los Angeles, Cal. Martin TT Tractor used in test flights, equipped with Curtiss 8-cyl. OX 90 horsepower motor.

No. 596—Jack R. McHugo, of the Christofferson School, Redwood City, Cal. Curtiss type biplane used in test flights, equipped with Curtiss 75 horsepower motor.

No. 597—Peter Maraschi, of the Christofferson School, Redwood City, Cal. Curtiss type biplane used in test flights, equipped with Curtiss 75 horsepower motor.

No. 598—LeGrand B. Cannon, of the Curtiss School at Buffalo, N. Y. Curtiss Tractor JN4 used in test flights, equipped with Curtiss OX2 90 horsepower motor.

No. 599—Lieutenant Dean Smith, N. G., New Mexico, of the Martin School, Los Angeles, Cal. Martin TT Tractor used in test flights, equipped with Curtiss 8-cyl. 90 horsepower OX motor.

No. 600—Sen Yet Young, of the Curtiss School, Buffalo, N. Y. Curtiss Tractor JN4 used in test flights, equipped with Curtiss OX 90 horsepower motor.

No. 601—G. L. Bumbaugh, of the Atlantic Coast Aeronautic Station, Newport News, Va. Curtiss Tractor Biplane JN4 used in test flights, equipped with Curtiss OX 90 horsepower motor.

No. 602—Douglas Manning, of the Atlantic Coast Aeronautic Station, Newport News, Va. Curtiss Tractor JN4 used in test flights, equipped with Curtiss OX 90 horsepower motor.

No. 603—Burton McK. Doolittle, of the Martin School, Los Angeles, Cal.. Martin TT Tractor used in test flights, equipped with Curtiss OX 90 horsepower motor.

No. 604—Harman John Norton, of the Curtiss School, Buffalo, N. Y. Curtiss Tractor JN4 machine used in test flights, equipped with Curtiss OX2 90 horsepower motor.

No. 605—Carter Tiffany, of the Curtiss School, Buffalo, N. Y. Curtiss Tractor JN4 used in test flights, equipped with Curtiss OX2 90 horsepower motor.

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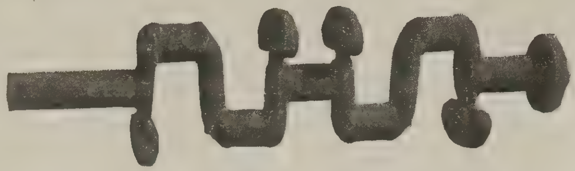

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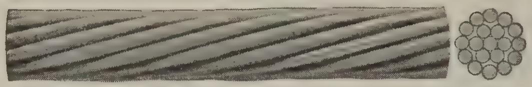

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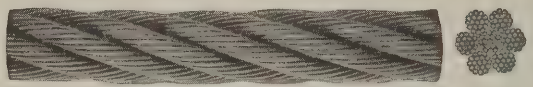

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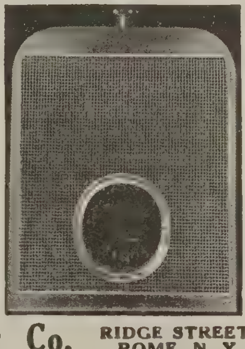

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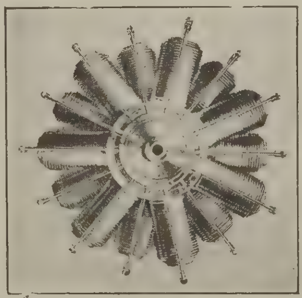

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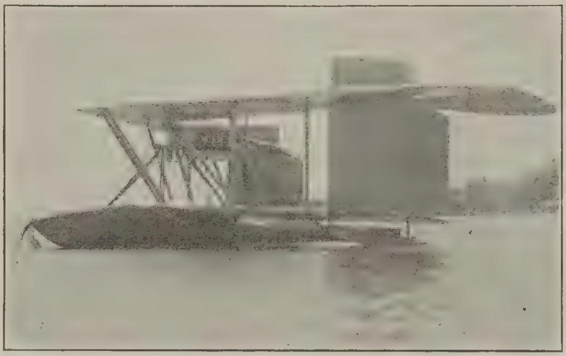

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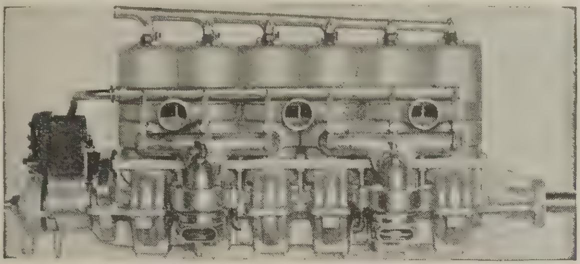

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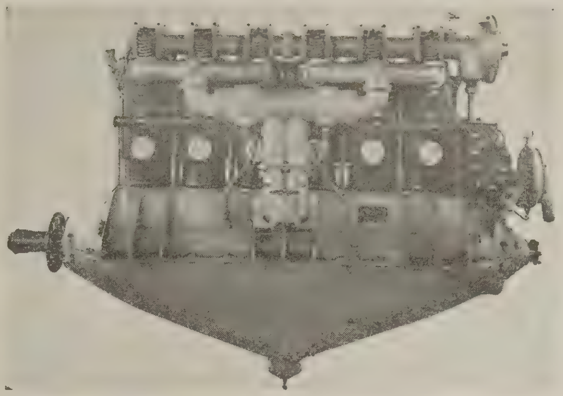

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Such a production (which it is expected will not only continue, but greatly increase during the next two years), allows the use of three hundred skilled mechanics, each trained to do his individual part in the manufacturing, assembling and testing of Hall-Scott motors. It permits of systematizing to such an extent that each individual part may be subjected to a careful and rigid inspection after every operation through which it goes before completion. An elaborate and expensive testing department can be provided under such a production, whereby the complete power plants are given a most thorough and exhaustive test by Hall-Scott testers. These tests are witnessed, however, by expert engineers not connected with our company in any way. This insures each prospective purchaser that they will obtain a power plant that is up to Hall-Scott standard. A large experimental room is kept extremely busy with skilled engineers using their best efforts to perfect and improve our present motors. Other types are being assembled and tested by this department in order that the high standard set by Hall-Scott power plants today will continue to be upheld in the future.

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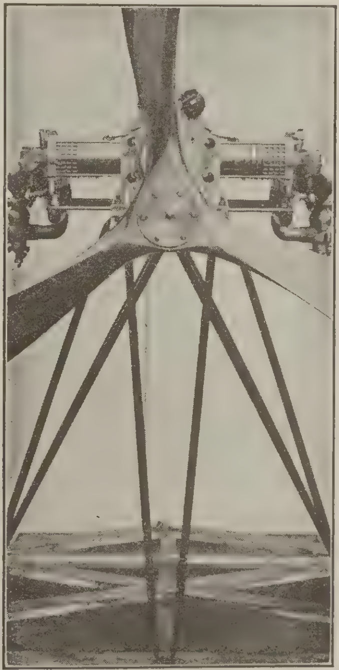


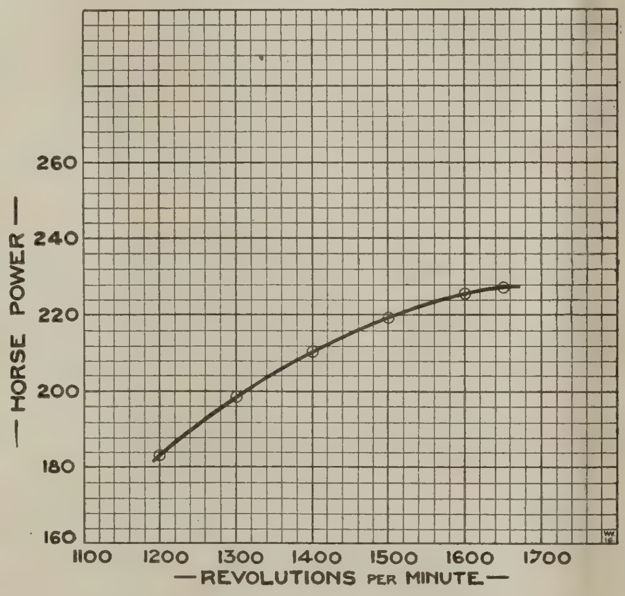
This photograph clearly indicates the small amount of head resistance of the entire power plant of the improved ASHMUSEN 12-cylinder, 105 H. P., self cooled aeronautical motor as mounted on one type of standard.

Our new modern manufacturing plant is now producing these motors and the 8-cylinder, 70 H. P. motors exclusively and regularly.

Ashmusen Manufacturing Co.
266 Pearl St., Providence, R. I., U. S. A.

NOTICE

OWING to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed Horse Power	210.50
Minimum Observed Horse Power	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

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AERIAL AGE WEEKLY

VOL. 4, No. 8 NOVEMBER 6, 1916 10 CENTS A COPY

National Aeroplane Fund Report Shows Tremendous Accomplishment

Regarding Aeronautic Nomenclature

Specifications for Military Hydroaeroplanes

Modern Processes for the Technical Production of Hydrogen

WRIGHT-MARTIN

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THE FIRST
PAN-AMERICAN AERONAUTIC EXPOSITION

Grand Central Palace, New York, February 8th to 15th, 1917

TO FOLLOW THE AUTOMOBILE AND MOTOR BOAT SHOWS

Held Under the Auspices of

The Aero Club of America
The Pan-American Aeronautic Federation
The American Society of Aeronautic Engineers

THE preliminary announcement of the plans of the First Pan-American Aeronautic Exposition has created such tremendous interest, and so many requests for space have been received, that the original plans are being extended and the show space is being doubled.

The Exposition will afford the opportunity to show the tremendous progress that has been made in American Aeronautics in the past two years.

The people of two continents will come to the Exposition to see what the American Aeronautic Industry has produced for National Defense, utilitarian purposes and sport.

> The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos - Dumont, Honorary President, Pan-American Aeronautic Federation.

> Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

APPLICATIONS FOR SPACE SHOULD BE ADDRESSED TO

HOWARD E. COFFIN

CHAIRMAN, ORGANIZING COMMITTEE

Pan-American Aeronautic Exposition
297 Madison Avenue, New York

"IT'S IN THE SPOKES"

AFTER four years' exhaustive tests, The Ackerman Wheel Company offers to aeroplane builders a wheel of special design that will solve many of the difficulties hitherto encountered.

A series of successful laboratory tests were recently concluded. As the illustrations indicate, the wheel was attached to a large case, into which was loaded 1,500 pounds of sand. A side thrust blow, with the wheel seven feet removed from the point of contact, was calculated to give the wheel a stress of 27,000 pounds. This was when the wheel struck the plain floor surface. To test the wheel to its maximum, two cleats of wood were nailed to the floor, four inches in advance of the striking point, and under this test four spokes of the wheel were broken. Calculation showed that the energy of the blow totalled 49,800 pounds.

A special alloy, specially treated, is used to meet all conditions that the wheel can be subjected to. The steel receives a special process in the treating, so that it will give the required resiliency, starting at the center of the curve and gradually growing stiffer and stronger both to the hub and relative to the structure of the spoke. The spokes being made on the curve, they are hung on the hinge at the rim, being a unit in the hub, allowing them to open and shut according to the load placed on the hub.

In the aeroplane wheel it is found that the hub will leave the center four inches when maximum loaded, and return to center as load is decreased, without the springs taking a set. There has never before been a wheel invented which would meet any such conditions.

These wheels can be built according to size and weight of any load from 500 pounds up.

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Figure 1

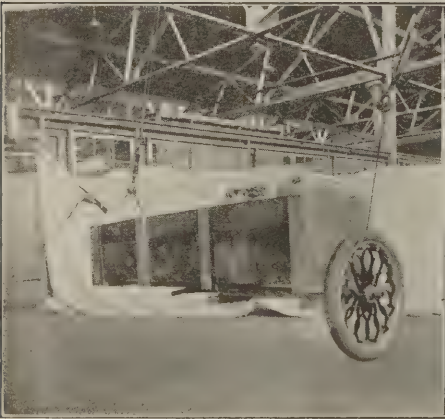


Figure 2

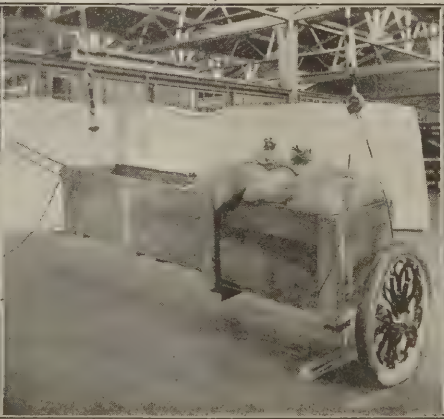
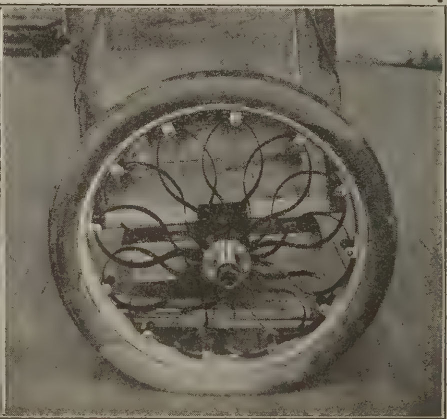


Figure 3



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Vol. IV NEW YORK, NOVEMBER 6, 1916 No. 8

NATIONAL AEROPLANE FUND REPORT SHOWS TREMENDOUS ACCOMPLISHMENT

PUBLIC-SPIRITED citizens did more for the development of aerial defense and aviation in this country through the National Aeroplane Fund, which has been in existence less than a year, than did the citizens of either France or Germany through their Aero Funds. Following the call of their leading citizens, both the French and German Governments, shortly before the war, took up the development work themselves. Now the United States Congress, through the appropriation of $18,000,000 for aeronautics in this country, has taken up the work started by the National Aeroplane Fund, and it is expected that the development of aeronautics, now in the hands of the Aviation Section of the Signal Corps, U. S. A., will place this country in a commanding position among the nations of the world.

The National Aeroplane Fund, founded for development of the aerial resources of this country, has since its organization received contributions amounting to $378,381.17, according to a report submitted to the Board of Governors of the Aero Club by Alan R. Hawley, Henry A. Wise Wood and Henry Woodhouse, who were in charge of the collection and disbursement of the fund. This report was accepted and heartily indorsed by the Board of Governors.

The report follows in full:

Board of Governors, Aero Club of America

Gentlemen—As per authorization of your Executive Committee, dated May 19, 1916, and February 23, 1916, I have, with Messrs. Henry A. Wise Wood and Henry Woodhouse, attended to the affairs of the National Aeroplane Fund, and I take pleasure in presenting herewith a brief report of the work of the National Aeroplane Fund, and an audit of so much of the fund as passed through the hands of the Executive Committee of the Aero Club of America.

This audit, exhibit "A," shows that the sum of $171,031.17 was received direct, $147,314.92 of which was disbursed to carry out the purposes for which the money was subscribed. Of the balance, which amounts to $23,716.25, the sum of $20,876.76 is obligated for the $20,000 set aside for the prizes for the National Aerial Derby, prizes for model aeroplane competitions, expenses for the National Aerial Coast Patrol Commission, etc.

In addition to the sum so subscribed, there were given to the National Aeroplane Fund aeroplanes and course of training for militiamen and civilians, for the purpose of helping to build our aerial defenses, valued at $94,000, which are not included with the cash subscription to the fund, as per exhibit "B."

In addition, the funds, aeroplanes, and training secured for different states, in different ways, not shown on the books of the fund, but all being the direct result of the work of the administrators of the National Aeroplane Fund, and being valuable for what they contributed to the building of our aerial defenses, amount to about $109,300, as per exhibit "C."

This makes the total cash value of the contributions secured through the efforts of the administrators of the National Aeroplane Fund, for the upbuilding of our aerial defenses and developing our aeronautic resources $378,381.17. The value of resources developed is hard to estimate.

Furthermore, by means of the National Aeroplane Fund educational campaign, public interest was aroused to demand of Congress suitable appropriations for aeronautics in the Army, Navy, Militia, Aerial Reserve Corps and Coast Guard, which resulted in the appropriation for the different services of the sum of $18,000,000.

American Aeronautics at Lowest Ebb When National Aeroplane Fund Was Instituted

As can be seen from the reports covering the different lines of activity developed by the National Aeroplane Fund, which was started in the spring of 1915, when American aeronautics was at its lowest ebb, the National Aeroplane Fund succeeded in developing aeronautics in the Army, Navy, National Guard, Naval Militia; among college men, and in the Coast Guard and a dozen other fields.

This movement was started in the early spring of 1915, after Congress had adjourned and the international situation grew serious enough to make this country take stock of its defenses. There were at the time only about a dozen aeroplanes in commission in the Army and Navy combined, when we should have had one hundred times that number, and there were no prospects of relief, since the last Congress had allowed but a fraction of the amount needed for aeronautics. The maneuvers of the National Guard and Naval Militia of the states were being planned, but in no case was an aeroplane to be employed—the reason being that there were no funds available to pay for aeroplanes or for training Militia officers in aviation.

The Aero Club of America, the National aeronautic body, which has fostered the development of aeronautics in America since 1905, realizing the necessity of bringing immediate relief, decided to wait no longer for the Government to do its duty. It took steps to contribute materially towards providing aeronautical equipment and instituted the National Aeroplane Fund for the purpose of developing our aeronautical resources, organizing aviation units in the Militia of the states, building an aeronautical reserve, and creating in a general way sources of supply or personnel and equipment.

Press of the United States Gave Hearty Co-operation in Educational Campaign—Congressional Commendations

In the educational campaign, which was the backbone of the National Aeroplane Fund, which resulted in 2,000,000 pieces of literature being distributed during eighteen months, the committee has had the hearty co-operation of the press of the United States. We have received an average of sixty clippings a day regarding the work of the Aero Club of America during these eighteen months, including hundreds of editorials, not a single one of which spoke unfavorably of the National Aeroplane Fund or the work of the Aero Club of America. Many of these editorials have been reprinted in *Flying* and Aerial Age. A large number are given in exhibit "D."

The work of the National Aeroplane Fund has been highly commended by leading Congressmen and Senators, and was favorably mentioned on the floor of the House of Representatives. We have also been warmly praised by Washington officials. Also by the governors and adjutant-generals of the states and by hundreds of contributors to the fund, and others. Several hundreds letters, commending the work of the fund, are submitted in exhibit "E."

Eight Important Movements Advocated and Encouraged by the Fund Officially Adopted and Endorsed by the Administration

Some of the most important movements started or endorsed by the Executive Committee in connection with the campaign to develop our aerial defenses have been adopted and endorsed by the Administration are as follows:

(1) The Council of National Defense, which was advocated by the Aero Club of America and the other organizations co-operating through the Conference Committee on National Preparedness in May, 1915, was adopted by Congress, and President Wilson has just appointed the seven civilian members of the council, which include two prominent members of the Aero Club of America.

The organizing of the Council of National Defense is undoubtedly the most important step taken so far to develop real national preparedness. This country as a nation has been like a house divided. There has been practically no co-operation between the Government, the industries, the patriotic organizations, and the people. So our enormous resources and extensive industries have never been co-ordinated as the best interests of the nation demand. The council is to do the co-ordinating, and we expect that aeronautics will greatly benefit from the co-ordination of our aeronautical resources which the council may bring about.

(2) The large appropriation asked by the Aero Club of America for aerial defense, which seemed excessive when it was proposed, as it was six times greater than the estimates submitted to Congress by the Secretaries of War and the Navy, was adopted by Congress, and close to $18,000,000 was allowed for aerial defense, instead of $3,200,000 asked by the Secretaries of War and the Navy.

(3) The plan to organize twelve aero squadrons for the twelve militia divisions in the National Guard recommended by the Aero Club of America was adopted by Congress, which allowed an appropriation of $9,640,000 for carrying out the plan. About 1,000 National Guardsmen applied to the club for assistance in getting aviation training. It is evident, therefore, that the National Guard solves the problem of getting personnel for our aerial defenses. The Army has only succeeded in getting forty trained military aviators in eight years, and is this year limited, under the law, to less than 100 Army aviators, including the officers who have charge of administration. Our committee recommended that the number of Army aviators be increased this year to the full number allowed under the National Defense Act

for five years, which is only 148. But the recommendation was not acted upon. Therefore, the difference between that number and the 1,000 aviators which this country should have must be gotten from the National Guard and from civilians. The National Guard, having military training, is the best source of supply.

We found that National Guard eager for training in aviation, and thirty-three sttaes were about to take steps to organize aerial units when the emergency created by the Carrizal tragedy changed the plans. Many of the candidates for courses in aviation training had to go to the Mexican border with their commands. About 100 National Guardsmen who had taken up aviation training were sent to the Mineola, Long Island, Aviation Field, and put in charge of Army officers. But they could not complete their training during the summer owing to lack of aeroplanes.

(4) The plan to organize an Aerial Reserve Corps proposed by the New York *World* and the Aero Club of America, was authorized on July 13 by President Wilson, after a committee of the club's Executive Committee called at the White House and recommended the authorization of the plan.

At the time our committee recommended the authorization of the Aerial Reserve Corps last June, we had received about 2,000 applications for aviation training from patriotic civilians, who had read of our aerial deficiency and General Funston's request for more aviators, and were anxious to learn to fly and join the air service. Unfortunately, the Aviation Section of the Army was unable to arrange to look over these candidates and select those suitable for training during the summer, when most of these candidates could spend their vacation in training. We are advised, unofficially, at the date of writing, that the Aviation Section of the Army will soon issue the regulations for the admitting and training of candidates for the Aerial Reserve Corps.

(5) The plan of the Aerial Coast Patrol was promptly endorsed by President Wilson and the Secretaries of War and Navy, and an appropriation of $1,500,000 has been promised for putting the plan into effect.

Steps were taken to establish Aerial Coast Patrol Units, and a complete unit was established at Port Washington, Long Island—the Volunteer Aerial Coast Patrol Unit No. 1, organized by F. Trubee Davison and eleven other patriotic young men. This unit rendered valuable service in connection with the "Mosquito Fleet" maneuvers.

A Bill was introduced in the Senate to appropriate the sum of $1,500,000 for establishing units of the Aerial Coast Patrol under the auspices of the Navy, and in connection with the Naval Militia and Naval Reserves, but owing to the shortness of time, and the pressure of legislative business, Congress could not act upon it during the past session.

(6) The plan to use aeroplanes in connection with the Coast Guard, for the Life Saving Service and Revenue Cutter Service, first recommended by me five years ago, and since advocated by the Aero Club of America, and substantially supported by Byron R. Newton, the assistant secretary of the treasury, has been adopted by Congress.

(7) The plan to use aeroplanes for mail carrying, advocated by the Aero Club of America for several years, has been adopted and the postmaster general has invited bids for mail carrying over different routes where there is now spent $330,000 for carrying mail by other methods. The sum would be spent for aeroplane mail carrying if suitable bids could be obtained. The post office authorities are anxious to put this plan in operation and are giving every encouragement.

(8) The plan to interest the universities in aerial defense, the Aero Club of America has been carrying out insofar as it concerns aerial defense, and which was frowned upon some time ago, has been followed by a request from President Wilson to the heads of the leading universities to consider ways and means to arrange for the training in military science of students in sixteen of the country's leading universities and colleges under the auspices of the War Department.

Our committee, with the co-operation of Robert Bacon, offered a bonus of $50 for each Harvard undergraduate who learned to fly and passed the F. A. I. pilot tests. Twenty-one undergraduates took a course, twelve have already passed the tests. We have also offered three medals of merit to each of the hundred largest universities, having a total of about 350,000 students, the medals to be awarded to the three students who by March 15, 1917, write the best essays on (a) Military Aeronautics; (b) Mechanics of the Aeroplane and Possible Technical Development in Aeronautics; (c) Possible Application of Aircraft for Utilitarian Purposes.

American Society of Aeronautic Engineers Organized

To foster progress in the technical branch of aeronautics, and begin the work of standardizing the committee, at the request of Thomas A. Edison, organized the American Society of Aeronautic Engineers, which now includes in its membership all the prominent aeronautic engineers. The society is now being combined with the Society of Automobile Engineers, and Motor Tractor Engineers, and a new organization being created which is to be called the American Society of Automotive Engineers.

Pan-American Movement Organized

Appreciating the bacis value of Pan-Americanism from the standpoint of national defense, the committee started a movement to develop Pan-American aeronautics. Alberto Santos-Dumont was invited to come to the United States to co-operate in this movement. He came, and has been traveling through South and Central America, as the club's representative, and has already done some very constructive work. The organization of the Pan-American Aeronautic Federation was a direct result of the work of the Executive Committee. This federation is already a most powerful organization, and will be more so as time goes on. A large Pan-American Aeronautic Exposition is now being organized to be held next February. See Exhibit "E." Mr. Henry Woodhouse, with Mr. Henry A. Wise Wood, has been the father of the Pan-American movement in raising the $10,000 needed for the Pan-American Aviation Trophy, and prizes, to be competed for at Rio de Janeiro next summer.

Two Score Sportsmen Acquired Aeroplanes for National Defense

Giving a national defense aspect to the sport of flying resulted in two scores of sportsmen taking up aviation and acquiring their own aeroplanes for use of national defense in case of emergency.

The success of the aviation meet, held at Sheepshead Bay last spring, was a direct result of the work of the National Aeroplane Fund. Remarkable records were made at this meet, including non-stop flights from Newport News to New York with passengers.

Subsequently, and with the hearty co-operation of the New York *World*, a flight was made from New York to Washington, in which I was a passenger, for the purpose of carrying to Washington a special edition of the New York *World*, which advocated the training of 2,000 aviators, which plan was endorsed by the governors of practically all the states. This plan to train 2,000 aviators was favorably considered by Congress, and when a letter went to one of the Congressmen with a copy of the *World* was read on the floor of the House of Representatives, the House applauded and the letter was ordered printed in the *Congressional Record*.

Subsequently, and with the hearty co-operation of Rear Admiral Robert E. Peary, Congressmen Kahn, Lieb, Hulbert, and Senators Johnson and Sheppard, and Government officials, an exhibition of four aeroplanes was held in Washington. It lasted about two weeks and assisted greatly in educating the members of both Houses and making them realize the necessity of increasing the appropriations for aerial defenses.

National Aerial Derby Instituted

It was also through the interest created by the National Aeroplane Fund that Mr. Ralph Pulitzer offered the Pulitzer trophy, instituting the National Aerial Derby, which is to take place annually, and for which there has been set aside $20,000 to be given as prizes, this sum being part of the contributions made to the National Aeroplane Fund by Mr. Emerson McMillin, who requested that his contributions be spent at the discretion of the Board for whatever purposes the Board deemed best.

Inducement to Interest Younger Generation

To interest the younger generation in aeronautics, prizes were offered from the National Aeroplane Fund for model aeroplane contests, in which more than twenty model aero clubs in different parts of the country participated. Knowing that the Wright Brothers themselves became interested in aeronautics through a toy helicopter, we realized that offering prizes to encourage the younger generation may result in finding geniuses who may eventually create, or develop or invent something which will be of great value to mankind. To interest the still younger generation, at the time when the National Educational Association of the United States held its convention in New York, steps were taken to interest the 60,000 school teachers that attended the convention in aeronautics, and an aeroplane exhibition was arranged especially for the teachers, and they were given copies of *Flying*, donated by the publishers, containing the history of the development of aeronautics from the earliest ages; and a diploma to be awarded to a pupil in each school who writes the best composition on aeronautics.

Would Take Many Pages to Relate all the Achievements

The foregoing is only a brief outline of what has been accomplished by the National Aeroplane Fund. It would take many pages to give the less prominent achievements.

The committee received substantial and hearty support from the following governors of the club: Rear Admiral Robert E. Peary, Cortlandt F. Bishop, John Hays Hammond, Jr.; Evert Jansen Wendell, Charles Jerome Edwards, Albert Bond Lambert, George M. Myers, Henry B. Joy, Rodman Wanamaker, and the late Samuel H. Valentine.

It is hard for me to find words that will adequately express the value of the work done by Mr. Henry Woodhouse in connection with the National Aeroplane Fund. He subscribed the first $1,000 to make it possible to start the National Aeroplane Fund, and then made additional contributions during the campaign. He has given his entire time, practically sixteen hours a day, every day, including Sundays and holidays, to this work, practically only leaving the club house on occasions when he had to deliver addresses and to attend meetings or make trips of inspection in connection with the furthering of this campaign. He has done this without compensation or expectation of compensation. Very sincerely yours,

(Signed) ALAN R. HAWLEY, Chairman.

Audit of the Funds Received and Disbursed by the Executive Committee of the Aero Club of America

The report of the auditor of the funds received and disbursed by the Executive Committee of the Aero Club of America covers ten legalscap pages, showing in detail the receipts and disbursements of so much of the fund as passed through the hands of the Executive Committee of the Aero Club of America. This report shows that the sum of $171,031.17 was received, of which was disbursed the sum of $147,314.92 to carry out the purposes for which the money was subscribed. Mr. Emerson McMillin leads the subscribers, having contributed $33,956.15; the largest recipient was the First Aero Company, N. Y. N. G., which received $21,535.74. The Militia of Rhode Island received the $7,500 contributed by Miss Lyra Brown Nickerson; the National Guard of New Mexico received a battleplane, costing $7,500, and the States of Massachusetts, California, and New Jersey received between $2,000 and $2,500. A number of other states received from $2,000 down each.

The traveling expenses of National Guard officers trained under the Curtiss offer and the training expenses of National Guard officers, trained at different aviation schools, cost $10,445. The largest expenses in connection with the educational campaign during which were distributed 2,000,000 pieces of literature, are: Stationery, printing, engraving, etc., $17,775.61; postage, $12,197.24; multigraphing, $12,180.79; expenses in connection with aeroplane demonstrations, exhibitions and prizes offered in competition with events held for educational purposes, including $660 in prizes awarded for model aeroplane competitions, total $5,405.71. The expenses of field officers and salaries of assistants, clerks and stenographers amounted to $19,432.16.

As shown on the report of the committee, the officers of the Aero Club of America, who acted as administrators of the fund, served without compensation.

The audit shows that $20,000 has been set aside in special deposit, to be given as prizes for the Transcontinental Aeroplane Contest, which has been postponed until 1917, Mr. Emerson McMillin having left to the discretion of the Board of Governors to use his contributions as they may deem best.

A recent contribution of $1,000 by Mr. John D. Rockefeller, Jr., has been set aside to pay the expenses of introducing aeronautics in universities. The sum of $1,000, subscribed by Mr. Godfrey L. Cabot, to pay expenses of sending a trained aviator from State to State to assist in organizing aviation sections is also set aside in special deposit. The general fund on hand on the 30th of September amounted to $2,839.49.

The report and audit were accepted and approved by the Board of Governors and ordered printed in condensed form. The committee, which has had charge of the affairs of the fund, was complimented by the Board for its faithful, untiring efforts and most substantial results obtained.

The exhibits submitted with the report show that the National Aeroplane Fund did a tremendous amount of missionary work, and the committee in direct charge, whose acts were submitted weekly to the Executive Committee for approval, had a remarkable grasp of the problems to be solved and an extraordinary control of resources. It conducted this eighteen months energetically and got the best results that could possibly be obtained.

Part of Exhibits B and C, giving the funds, aeroplanes and training in aviators for national defense presented to different States, through the interest created by the National Aeroplane Fund, but not shown on the books of the Fund, include the following items:

Rhode Island Committee, started by George I. Scott, with the co-operation of Alan R. Hawley and Henry Woodhouse, raised $15,000 for the Militia of Rhode Island.........	$15,000.00
Vincent Astor Committee raised $8,000 for a seaplane for the Second Battalion, New York Naval Militia...........	8,000.00
Maine Committee, headed by Rear Admiral Peary, raised $10,000 to establish Aerial Coast Patrol Station........	10,000.00
Seaplane presented by Godfrey L. Cabot to Massachuetts Militia	8,000.00
F. T. Davison, H. P. Davison, Jr.; Robert Lovett, and nine other Yale men, with the close co-operation of Messrs. Alan R. Hawley, Rear Admiral Peary, John Hays Hammond, Jr.; Henry Woodhouse, formed Volunteer Aerial Coast Patrol Unit No. 1, the equipment of which alone cost not less than....................................	25,000.00
The Harvard Undergraduates Aviation Training Committee, with the co-operation of the officers of the club, sent twenty-one men to aviation schools to get training, costing	8,400.00
Michigan Committee, headed by Russel A. Alger, raised $11,800 for seaplane for the Michigan Militia...........	11,800.00
Fund raised by John M. Satterfield, president Aero Club of Buffalo, Captain of Second Aero Company, N. Y. N. G.	6,000.00
Fund raised by Charles A. Johnson, president Aero Club of Colorado National Guard..............................	3,000.00
Fund raised by A. B. Lambert, president Missouri Aeronautic Society for Missouri Militia.........................	2,600.00
Two training aeroplanes presented by Mr. Inglis M. Uppercu to New Jersey Militia, valued at................	10,000.00
Flying boat, valued at $7,500, and course of training for two men, valued at $800, presented by the Curtiss Aeroplane Company to the First Battalion, New York Naval Militia	8,300.00
Spherical balloon, presented to the New York National Guard by Robert Glendinning, valued at.....................	1,000.00
Seaplane, presented by Glenn L. Martin to the California Naval Militia, valued at............................	7,500.00
Curtiss Aeroplane Company, training one militiaman from each State, valued at $400 each.....................	19,200.00
Thomas Aeroplane Co., training six militiamen, valued at $400 each	2,400.00
Earl W. Dodge, training sixteen college men, valued at $400 each	6,400.00

The National Aeroplane Fund report shows more extensive results and in less time than either the French or the German Aero Funds—and without that helpful co-operation which the French and German Governments accorded but the U. S. Government did not.

APPEAL TO JUDGE ADVOCATE OF THE ARMY TO REMOVE OBSTACLES IN WAY OF GETTING 1,000 AVIATORS

HAVING received more applications for assistance from National Guardsmen who have applied for the aviation training under the direction of the Army, which is provided for by Sections 60, 83 and 99 of the National Defense Act of June 3, 1916, to provide which, Congress allowed the sum of $9,640,000, and having received from Secretary of War Baker a letter advising that the order limiting the number of National Guardsmen to be trained in aviation to fifty would not be rescinded, Mr. Alan R. Hawley, Chairman of the Executive Committee of the Aero Club of America, is appealing to the Judge Advocate General of the Army, Brigadier General Enoch H. Crowder, to decide whether the National Guard is not, by Act of Congress, entitled to aviation training under the direction of the Army.

Mr. Hawley wrote to Secretary Baker some time ago, pointing out that under the National Defense Act one thousand aviators can only be obtained by getting all the aviators under this act for five years, which number 148 for the Regular Army, an equal number for the Aerial Reserve Corps, and the difference from the National Guard; and that if the order limiting to fifty the number of National Guardsmen to be trained in aviation under the direction of the Army, issued September 8th, is not rescinded, it would be physically impossible to get more than 350 aviators for our land defenses. Mr. Hawley also pointed out to Secretary Baker that whereas the Army has full control of the National Guard, who take their training under the direction of the Army, these Guardsmen could be made as efficient as the Army cares to make them, and all possible inefficiency or waste eliminated.

Secretary Baker answered as follows:

"Alan R. Hawley, Esq.,
President, the Aero Club of America,
297 Madison Ave., New York City.

"Dear Mr. Hawley:

"I beg to acknowledge receipt of your letter of the 9th instant, which was referred to the Militia Bureau, which bureau prepared and issued the order you mention.

"It appears that the order in question, as well as all others affecting the aviation service of the Army and the National Guard, is strictly in accordance with law. It is therefore impracticable to rescind the order complained of.

"Very sincerely yours,
"*(Signed)* NEWTON D. BAKER,
Secretary of War."

In the appeal to the Judge Advocate General, Mr. Hawley points out that the bulk of the thousand aviators cannot be obtained except by the Army arranging for the training of National Guardsmen. He then cites the following evidence that Congress intended to have the Army train the National Guard:

(1) In the "Congressional Record" of August 9, page 14363, is recorded the following evidence of the intention of Congress that the Army shall train the National Guard aviators.

Congressman Greene (of Vermont) was speaking:

> *"There was a Senate amendment to this Army Appropriation Bill making specific appropriation for the establishment and maintenance of an Aviation Service in the National Guard. Will the Chairman of the Committee kindly say what is the result of that proposition under the Conference report?"*

Congressman Hay, Chairman of the Committee on Military Affairs, answered Congressman Greene, as follows:

> *"Under this bill* $13,000,000 *is appropriated for aviation purposes.. I am informed by the War Department that* $10,000,000 *of that will be devoted to the development of aviation in the National Guard, and that they do not need any language in the bill to enable them to devote that amount of money to that purpose."*

(2) The estimates prepared by the Aviation Section of the Army and submitted to Congress, a copy of which was given to the Aero Club of America by officers of the Aviation Section at the time, and is now submitted to the Judge Advocate General, shows that the Aviation Section asked the sum mentioned for the organization, equipment and maintenance of twelve aero squadrons for the twelve Militia Divisions provided for in the Tables of Organization, as well as by the new National Defense Act.

It is also pointed out that to organize and maintain an aero company for a year under the Army Regulations, it costs between $100,000 and $200,000, and that it is beyond the means of States or groups of individuals, and cannot be accomplished without Federal support.

Under the new regulations an aero company must have one captain, five first lieutenants, one master signal electrician, two first-class sergeants, five sergeants, nine corporals, fourteen first-class privates, six privates and two cooks—making six officers and 39 enlisted men. Of the enlisted men, twelve mechanics are necessary—six to care for the motors and six to care for and make repairs on planes.

Mr. Hawley points out that great advance could be made in getting the aviators and aviation mechanics by training the six officers and twelve aviation mechanics for each aero company under the direction of the Army, and that Sections 60 and 99 of the National Defense Act authorizes the Army to do this, and Congress, having allowed the funds for doing it, and the country needing aviators badly, there should be no further delay or obstacle in training National Guardsmen.

The Club, like others, would prefer to have the 1,000 aviators in the Army.

Wright-Martin Submarine Working Arrangement

THE Submarine Boat Corporation is about to enter into a working arrangement with the Wright-Martin Aircraft Corporation, recently organized by strong interests to manufacture aeroplanes and aeroplane motors. The Wright-Martin Corporation is a consolidation of the Wright Aeroplane Co., the Glenn L. Martin Aeroplane Co., and the Simplex Automobile Co.

Under this new working arrangement the Submarine Boat Corporation will recognize the validity of the Wright aeroplane patents, and will work in close harmony with the Wright-Martin Corporation in the development of the aeroplane business.

The Submarine Boat Corporation has extensive foreign connections, with efficient organization in nearly every country of importance in the world, and the new working arrangement will permit the Wright Corporation therefore to secure an important position both in this country and abroad in the manufacture and sale of aeroplanes.

The Boat Corporation will manufacture aeroplanes under license from the Wright-Martin Corporation; will build its own planes, but purchase its motors from the Wright Corporation, which has expended nearly $3,000,000 at its plants at New Brunswick, N. J., to construct and equip plants for the manufacture of the Hispano-Suiza aeroplane motor, representing the highest development of the aeroplane motor abroad, and which is being manufactured in this country by the Wright Corporation under license from the French Government.

In these two corporations is represented the development of two of the most important factors of the present great war. The value of both the submarine and the aeroplane has been definitely established, and undoubtedly the two together will turn out to be the decisive factor of the present conflict. With two corporations of such size, so well equipped both from a manufacturing and world-wide organization point of view, working in close harmony there is certain to be a rapid development of the aeroplane industry in this country, for Europe can be counted on to take any output of aeroplanes and motors from this country not required for our own purposes.

The Wright-Martin Aircraft Corporation owns the Wright patents. The old Wright company had been inactive in the manufacture of aeroplanes, awaiting the development of a motor suitable for its purposes. The new company has solved this problem by acquiring the right to manufacture in the United States, the Hispano-Suiza motor, which has been adopted by the French and Russian Governments. The company is now working on an order of 450 of these motors.

To manufacture motors of the class required, the new Wright company acquired all the capital stock of the Simplex Motor Car Company, of New Brunswick, where several millions of dollars have already been expended in erecting suitable plants. The Simplex Automobile Company has long been regarded as the builder of the highest priced and highest grade automobile produced in this country. Its product embodied a standard of work comparable only with the standard of work necessary in the modern aviation motor.

The plant is said to be equipped to manufacture about 1,000 aviation motors of the Hispano-Suiza type per annum, as well as 500 large Simplex cars and 800 smaller type cars.

Another element of strength is that during the development of the aviation branch of the business, the company posseses a large and profitable automobile business which should earn sufficient profits of itself to earn dividends on the outstanding stock of the new company.

The Glenn L. Martin company is now putting out about six aeroplanes a week, at a profit of approximately $200,000 per annum; and while the present plant will be maintained at Los Angeles, another large aeroplane manufacturing plant will be established on the Atlantic coast. It is estimated that with 1,000 aviation motors, 400 aeroplanes, and 1,300 Simplex cars to be produced the coming year, the company's profits will be in the neighborhood of $3,340,000, or about $6 a share on the common stock, which has no par value.

The new Wright-Martin directorate indicates that many substantial financiers and men in commercial lines of business have faith in the future development of this branch of navigation. The board, as elected, includes the following: Harry Payne Whitney, Henry L. Sutphen, vice-president of the Submarine Boat Corporation; T. Frank Manville, president of the Johns-Manville Company; T. L. Chadbourne, Jr., of Chadbourne & Shores; E. M. Hagar, president of the Wright-Martin Aircraft Corporation: F. W. Allen, of Lee, Higginson & Company; C. S. Jennison; F. B. Adams, of Potter, Choate & Prentiss; N. Bruce MacKelvie, of Hayden, Stone & Company; H. D. Gibson, vice-president of the Liberty National Bank; Glenn L. Martin; S. F. Pryor, president of the Remington Arms Company; W. Hinckle Smith and Robert Glendenning, both of Philadelphia; David Goodrich, president of the Goodrich Tire & Rubber Company; Henry Lockhart, Jr., and John F. Alvord, president of the Hendee Manufacturing Company.

Present Able Aero Club of America Administration Unanimously Nominated for Another Term

THE present able administration of the Aero Club of America was unanimously nominated for another term at the last meeting of the Board of Governors.

There being no opposition ticket, the officers and Board of Governors will be as follows:

President, Alan R. Hawley; first vice-president, Henry A. Wise Wood; second vice-president, Cortlandt F. Bishop; third vice-president, Chas. Jerome Edwards; fourth vice-president, Godfrey L. Cabot; treasurer, Charles Elliot Warren; secretary, William Hawley. Cortlandt F. Bishop, James A. Blair, Jr., Robert J. Collier, Howard E. Coffin, W. Redmond Cross, Chas. Jerome Edwards, Brig. General Robert K. Evans, U. S. A., Max C. Fleischmann, John Hays Hammond, Jr., Alan R. Hawley, Francis L. V. Hoppin, Henry B. Joy, Albert B. Lambert, William W. Miller, James E. Miller, George M. Myers, Harold F. McCormick, Rear Admiral Robert E. Peary, Raymond B. Price, Allan A. Ryan, Alberto Santos-Dumont, Evert Jansen Wendell, Henry Woodhouse, and Henry A. Wise Wood compose the Board of Governors.

Roosevelt the Pioneer Official Supporter of Aeronautics

THE statement which we published some weeks ago that "a Roosevelt Administration in 1907 gave the United States Army the first aeroplane ever used for military purposes, at a time when aeroplanes were not yet known to be capable of flight, and with remarkable foresight and progressiveness, gave the United States Army an aeroplane two years before any other country took a similar step," has brought to us a most interesting statement from Rear Admiral C. M. Chester, which reads into the history of aeronautics in this country an important fact hitherto known only to a few people. Admiral Chester writes:

"It may not be out of order at this critical time of the country's history, to tell a little secret that has been known for a long time to some pioneers in military aviation, and which, to my knowledge, has never been published.

"In 1897, when Mr. Roosevelt was Assistant Secretary of the Navy, and Professor Langley, the Secretary of the Smithsonian Institute, was so assiduously employed upon the problem of aviation, a well known Senator went to President McKinley and told him that the professor had expended all of his available means on the search for the laws which govern mechanical flight and must have some support from the Government or give up his efforts to evolve a measure of vast military value to the country. The President told the Senator that he did not know how it would be possible for the Government to assist in the matter under the law, but that if there was any man in the Administration that could find a way to bring it about, it was Roosevelt; and he sent the Senator to see the Assistant Secretary of the Navy. Mr. Roosevelt took up the subject with his characteristic energy, and soon found that the Fortification Board of the Army had an appropriation for experimental purposes for the national defense, under its charge, which answered the required conditions, and he procured the necessary means for Professor Langley to continue his investigations.

"The world now realizes that the successful accomplishment of mechanical flight is due more to the studies of Langley than to any other cause; but it does not know that the professor's efforts would have come to naught but for one of 'The Roosevelt Policies.'"

To Interest 100,000 Pan-American Students in Aeronautics

AS a further step to develop Pan-American aeronautics and to interest college students of the Pan-American Republics in the subject, the Aero Club of America has decided to offer three medals of merit to each of a number of universities of the twenty republics of the Pan-American Union.

The Club has already offered a $10,000 Pan-American aviation trophy, with prizes, which is to be competed for at Rio de Janeiro next year.

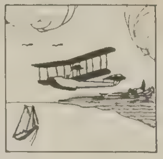
Mr. Alberto Santos-Dumont, the Brazilian pioneer, is now in Brazil representing the Aero Club of America, making arrangements for the contest for this trophy. The trophy is to be contested for between the representatives of the Pan-American Aeronautic Federation, which comprises all the national clubs of the republics of the Pan-American Union.

Mr. Santos-Dumont has advised the Aero Club of America that the Aero Club of Brazil has also offered a trophy and prizes for competition at the same time as the Pan-American Aviation Trophy is being competed for, and is making extensive preparations to make this first Pan-American aviation event a great success.

The Pan-American authorities in the United States and all the Pan-American republics are enthusiastic over the plan of the Aero Club of America to develop Pan-American aeronautics, the general consensus of opinion being that the present day aircraft, particularly the latest huge air yachts, which can carry five tons of useful load at a speed of between 80 and 100 miles an hour, will solve some of the most difficult problems of transportation of South and Central America. They believe, with Santos-Dumont, that "The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war."

Among the Pan-American leaders who are co-operating with the Club in carrying out the plan to develop Pan-American aeronautics are: Hon. John Barrett, Director General, the Pan-American Union; Sr. Manuel Estrada Cabrera, President of Guatemala; Amador F. del Solar, President, Aero Club of Peru; Col. Carlos Nunez del Prado, President, Aero Club of Paraguay; Victor Hugo Barranco, Representative of Cuban Government; Jorge Matte Gormaz, President, Aero Club of Chile; Alberto R. Mascias, President, Aero Club of Argentine; Joaquin C. Sanchez, President, Aero Club of Uruguay; Manuel Seminario, President, Aero Club of Ecuador.

THE NEWS OF THE WEEK



Portland to Have Aero Club.

If plans which are now being fostered in Portland, Oregon, materialize, that city will shortly have an aero club. Much local interest has been evidenced in the project.

Hammond Sea Plane Nearing Completion

Rapid progress has been made by the Burgess Company at Marblehead, Mass., on the new seaplane of the Dunne type, which is to be used in the experiments of John Hays Hammond, Jr., with wireless control of torpedoes from the air. This machine, which is built to the order of the War Department on designs especially prepared for the trials, will be a heavy weight carrier, lifting a complete load of about 3,100 pounds.

This weight will comprise about 2,020 pounds for the machine light, 330 pounds for pilot and passenger, 200 pounds for the radio kit, and fuel and oil for four hours' flight, totaling about 350 pounds.

The span is 46 feet and the length over all 27 feet, the greatest depth of the chord in the center is 7½ feet, tapering at the tips to 5 feet 5 inches, the total wing area will be about 750 square feet, while the gap between the planes is 6 feet 6 inches, with a 2½-foot stagger forward of the upper surface.

One of the novelties of the design which is expected to provide a special degree of stability fore and aft is the difference in the angles of the upper and under surfaces; the forward part of the upper surface being set at 6 degrees of incidence, while the under surface is 4 degrees. The aielerons at the wing tips have a marked negative angle and through the difference in the high angles at the front of the entering edge and the negative angle at the wing tips which are behind the center of gravity, the longitudinal stability is expected to be thoroughly established.

This machine will probably be completed by the middle of November, and the experiments by Mr. Hammond, which will be witnessed by Lieut. Shepler W. Fitzgerald, U. S. S., will go on as rapidly as weather conditions will permit, off Mr. Hammond's wireless station at Gloucester.

The North Carolina to Return to Pensacola.

The cruiser North Carolina, mother ship of the naval aeronautical station, will return to Pensacola for permanent station as soon as she undergoes repairs at Portsmouth Navy Yard. The North Carolina will carry in addition to a large kite balloon several Curtiss aeroplanes and a new Burgess-Dunne School machine.

H. P. Davison Flies Over Battle Front.

Mr. H. P. Davison, partner in J. P. Morgan & Co., has just returned from Europe where he made a flight in a French battleplane over the German lines. During the flight he witnessed the French attack on Combles. Mr. Trubee Davison, who was the moving spirit in the organization of the first unit of the Aerial Coast Patrol at Fort Washington, is a son of Mr. H. P. Davison, who also has been tremendously interested in the unit.

Sperry and Baker Pass Aviation Tests.

"Hobey" Baker, former Princeton football and hockey star, and Lawrence B. Sperry passed the test for reserve military aviators, October 20. Sperry flew from Governor's Island to Mineola, where Baker was waiting. The two then flew together to Glen Cove and Cold Spring Harbor and back.

During the flight of forty-five minutes the two machines were never more than 100 feet apart. The maximum altitude was 4,500 feet, the height required by the test.

Admiral Peary Discusses Aerial Preparedness.

Rear Admiral Robert E. Peary, speaking at the Mount Morris Baptist Church, New York City, October 29, on the importance of aerial craft, asserted that aviators are destined to be more important as a means of national defense than the Army and Navy combined. The Rear Admiral said further that there should be sufficient aviators trained for aeroplane and hydroplane service to establish a continuous picket line of birdmen a hundred miles from shore along our Atlantic, Gulf and Pacific coasts. In this manner, he said, we would be able in war time to prevent any enemy warship from penetrating the line without sufficient notice being given to the officials at Washington.

Going into the subject of aviation in detail, the Rear Admiral said that he was in favor of a Government department of aeronautics separate and independent of the Army and the Navy, and that a new member of the President's cabinet be provided to handle the details of the department. He asserted a comprehensive system of aviation training schools should be provided for in each of the principal geographic centers.

Experimental Laboratory at Stanford University

An aerial experimental station is to be erected at Stanford during the coming semester by Professor W. F. Durand, head of the mechanical engineering department. The station will be used largely for the benefit of the National Advisory Committee for Aeronautics.

Professor Durand was named chairman of the National Advisory Committee on Aeronautics at its meeting in Washington recently. It is now an established and permanent committee as the result of action by Congress.

Problems in relation to propellers will take the attention of the local laboratory at first, some fifty different models being up for consideration by the War Department at Washington. Professor E. P. Lesley is assisting Professor Durand in the work at Stanford.

Advisory Committee Visits Curtiss Plant

For the purpose of getting firsthand information as to the equipment and capacity of the Curtiss Aeroplane Company for turning out machines for Army and Navy use, members of the National Advisory Committee for Aeronautics, headed by Dr. Joseph S. Ames, of Baltimore, president of Johns Hopkins University, were in Buffalo, October 23.

The personnel of the committee's delegation was as follows: Col. George O. Squier, chief of the Aviation Section of the U. S. Army; Dr. Charles W. Wolcott, of the Smithsonian Institute; Naval Constructor H. C. Richardson; Mark L. Bristol, lieutenant in naval construction; Dr. S. W. Stratton, chief of the Bureau of Standards; John Dickinson, of the Bureau of Standards, and Dr. Ames.

Professor W. F. Durand, of the University of California, is chairman of the committee. He was not able to make the trip. They were escorted to the Curtiss plant in automobiles. Also guests at the luncheon at the Buffalo Club were these Buffalonians: K. B. McDonald, Munroe Wheeler, Charles Manly, A. F. Zahm, and C. B. Kirkham.

Following the luncheon the party was taken in automobiles to the Curtiss aviation field, where they inspected the hangars and watched some flights.

Mrs. Adams Visits American Aviation Corps.

Mrs. Harriet Chalmers Adams, wife of Franklin Adams, Editor of the Pan-American Bulletin, has just returned from a three months' visit to France.

She visited the American Aviation Corps at Buc, where she was tremendously interested in the work being done by the Americans whose photographs we published in the last issue of Aerial Age.

The start of the balloon race at Muskogee, October 7, as seen from one of the first balloons to ascend.

Wright-Martin Stock Activity.

The transactions in Wright-Martin Aircraft on the Curb are on a when-as-and-if-issued-basis, the element of uncertainty regarding the offering price having entered into contracts made to date. Thursday of last week was a big day in the stock, over 70,000 shares changing hands, as compared with the biggest previous day of not more than 2,000 shares.

Six Balloons Enter Competition.

Propitious weather favored the start of the international balloon race at Muskogee, Okla., October 7. Six balloons were entered and every pilot was enthusiastic over the prospect of floating away to Canada and breaking the long-distance record. Ballooning enthusiasts from all parts of the country were present to give the pilots a send-off. The entries follow in the order of departure:

Warren Razor, Aero Club of Dayton, O.

William F. Assmann, in balloon, St. Louis.

Dr. L. E. Custer, Aero Club of Wichita, Kans.

Captain H. E. Honeywell, St. Louis, balloon, Uncle Sam.

E. S. Cole, Cleveland, O.

Captain John Berry, Million Population Club, St. Louis.

Captain E. H. Honeywell, of Kansas City, in the Uncle Sam, and F. S. Cole, of Cleveland, Ohio, in the White, apparently made very nearly equal records, something more than four hundred miles. The former landed near Cascade, Iowa, while Mr. Cole came down near Charlton, in the same state.

Warren Razor, of Dayton, Ohio, alighted near Odessa, Mo.; William F. Assman, of St. Louis, came to ground over Macon, Mo., when his balloon ripped at an altitude of 14,000 feet, and Dr. L. E. Custer, of Wichita, landed twenty-five miles west of Muskogee.

Captain Honeywell, after making his descent, said a bullet was fired into the Uncle Sam as it crossed into Kansas, as a consequence of which the bag leaked badly all night. He was forced to land when the gas gave out.

Don McGee Flies from Ludington to Saginaw.

Don McGee flew from Ludington to Saginaw, a distance of 137 miles, on October 13. He followed the Ludington division of the Pere Marquette railroad and his time at various stations was as follows: Left Ludington 8:15 a. m., passed Custer 8:25, Walhalla 8:29, Baldwin 8:35, Chase 8:45, Olivers 8:52, Reed City 8:58, Hersey 9, Evart 9:08, Lake 9:19, Farwell 9:24, Clare 9:30, Loomis 9:32, Coleman 9:33, North Bradley 9:36, Sanford 9:41, Midland 9:46, reached Saginaw 10 a. m.

He covered the 137 miles in one hour and 45 minutes. The fastest Pere Marquette train from Ludington to Saginaw makes the run in five hours and five minutes.

General Electric Co.'s Testing Apparatus.

The General Electric Company, at its plant in Schenectady, has laboratory apparatus for testing tensile strength of materials, hardness (Brinnel and Shore), and the Ericson sheet testing machine.

Army and Navy Orders.

First Lt. J. Kennard, 7th Cav., is attached to Aviation Sec. of Sig. Corps as an aviation student and will proceed to San Diego (Cal.) Sig. Corps Aviation School for duty.

Capt. E. N. Macon, retired, is relieved from duty as Supply Officer at Sig. Corps Aviation Station, Chicago, and from further active duty with Aviation Section of Sig. Corps, and proceed to his home.

1st Lt. W. R. Van Sant, retired, is assigned to active duty and will proceed to Chicago and report to Commanding Officer, Sig. Corps Aviation Station there, for duty as Supply Officer.

Col. W. L. Kenly, F. A., and Lt. Col. H. G. Bishop, 8th F. A., will proceed without delay to Sig. Corps Aviation School, San Diego, to take the Field Officers' course in aviation. Col. Kenly is relieved from duty at Jefferson Barracks, and from further duty on recruiting service.

First Lt. Hubert R. Harmon, C. A., to Ft. Slocum for examination for detail in aviation section, Sig. Corps.

First Lt. Edwin B. Lyon, Cav., to Ft. Sam Houston for examination for detail in aviation section, Signal Corps.

Following aviation students now at Sig. Corps Aviation School, San Diego, report to board of officers for examination for rating as junior military aviators Sig. Corps: First Lts. John C. Walker, Jr., Inf. (detached list); Paul L. Ferron, C. A. (detached officers' list); Martin F. Scanlon, Inf. (detached list); John D. Von Holtzendorff, F. A. (detached list), and Richard B. Barnitz, Cav. (detached list).

First Lt. John E. Rossell, Inf. (detached list), attached aviation section Sig. Corps, an aviation student, to Sig. Corps aviation school, San Diego.

Rochester Engineering Society Hears Aeronautic Lecture.

Paul G. Zimmerman, sometime of the Rochester staff of the Knox Automobile Company, now chief engineer of the Curtiss Aeroplane Co., spoke before the Rochester Engineering Society last week on "The Development of Aircraft and Its Relation to Warfare."

"The planes that dash and curve above the warring forces in Europe," he said, "are more enduring and a more glorious monument than any stone to Tatin, Stringfellow, Chanute, Lilienthal and our own beloved Langley and other inventors. While the development of aircraft has been very rapid during the last three years, the end has not been reached. Further work will be done, and as the De Witt Clinton bears little resemblance to the giant locomotive of to-day either in tractive power or speed, so will the aeroplane as we know it bear little resemblance to the aeroplane of a generation hence."

Duck Shooting by Flying Boat.

E. Kenneth Jaquith, son of a Chicago banker, has introduced duck shooting by flying boat at Atlantic City, and the new sport has taken quite a hold. Those who have been shooting with Mr. Jaquith describe it as the most exhilarating of sports. He intends to introduce it at Palm Beach later in the winter.

"I first used it in the South, using only a revolver to take pot shots whenever I encountered a flock of game birds," said Mr. Jaquith. "My passengers there became fond of pistol practice from the air. When the duck season opened here I decided to take a real gunning trip in my flying boat as a vacation. We had great success, and now I have engagements that keep me busy every day for the same sport."

New York-Newport Passenger Lines Contemplated.

Those dreamers who a few years ago were laughed at for maintaining that "aviation has stepped on the threshold of the practical stage and is starting on the career of utility" are on the point of seeing their dreams realized. The establishment of a line of passenger-carrying hydroaeroplanes, plying between New York and Newport, is seriously being considered.

A few days ago there was tested in Hammondsport, N. Y., the largest flying boat ever built. It rose from Lake Keuka with eleven passengers seated in the cabin. The pilot made the twelfth member of the party. Climbing gracfully to a height of 500 feet, it circled above the lake. The landing was remarkable for its accuracy.

This particular boat was built for a well-known American sportsman. It will be used as a pleasure craft. But others, some even larger, are to be constructed.

The Hammondsport craft has a wing spread of 76 feet. It is equipped with two eight-cylinder motors of 100 horsepower each. The propellers are pushers, somewhat like those upon the famous "strawberry crate" in which Wilbur Wright flew around the Statue of Liberty in 1909.

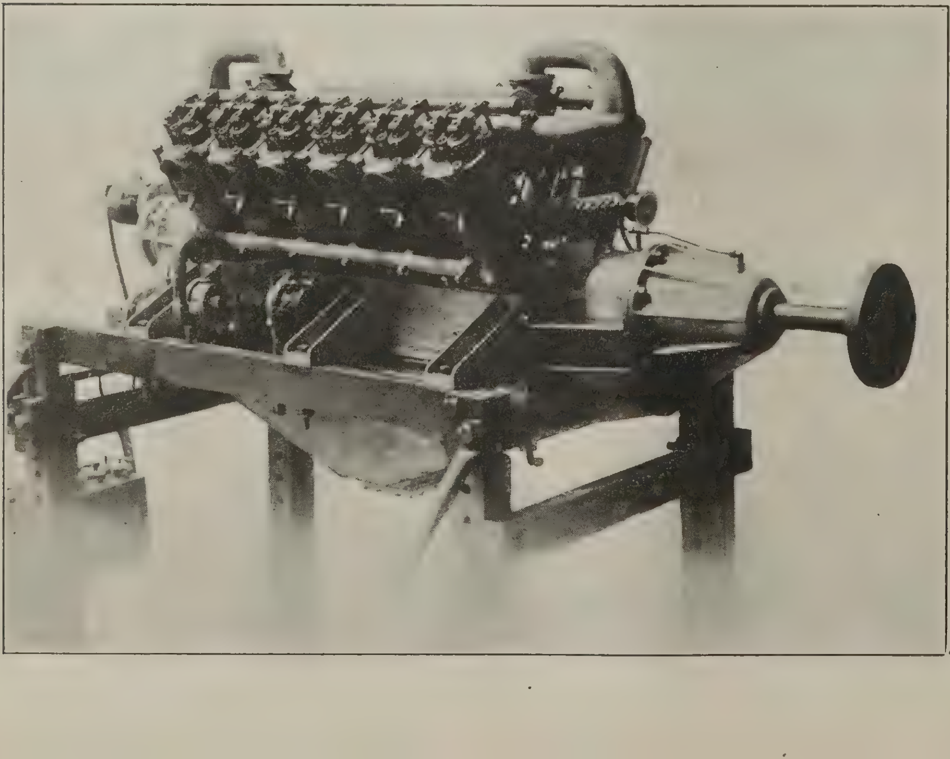
It is capable of a speed of 60 miles an hour—considered slow by aviators. Forward are two pilots' seats and aft in the cabin are seats for five or six passengers. Twelve were carried in the recent tests, but only for test purposes.

New Yorkers who repair to Newport in the spring of 1917 may be ready to buy passage on the New York to Newport Air Line and fly in safety and comfort to the Rhode Island resort.

Personal Paragraphs.

Lieut. Terah T. Maroney, Naval Militia, N. G. W., and well known because of his aviation achievements, has been designated by Brig.-Gen. Maurice Thompson, the Adjutant General, N. G. W., as one of the Washington fliers to take instruction at the Pensacola, Fla., station of the Aero Corps, U. S. A.

Flying against a gale, Clyde V. Cessna, Kansas aviator, made what is believed to be a record flight October 10th. In his own make monoplane Cessna flew from Douglass to North Wichita, a distance of thirty miles, in exactly seventeen minutes. He maintained a speed, in the face of the high wind, of nearly ninety miles an hour.



The improved twin-six aeronautic motor of the Atwood Aeronautic Co., Williamsport, Penn.

Holt-Welles Company Elects Officers.

At the recent annual meeting of the stockholders of the Holt-Welles Co., Inc., New York, manufacturers of the Bradford and Brown carbureters, the following officers were elected for the ensuing year: E. H. Stickels, President; F. E. Hamilton, Vice-President and Counsel; Calvert Holt, Treasurer; Paul Welles, Secretary; Wm. M. Williams, Assistant Treasurer and Secretary. The Board of Directors, composed of the above officers, was also elected for one year.

It is the intention of this company to greatly increase the scope of its operations during 1917.

Charles B. Page Resigns.

The announcement of the resignation of Chas. B. Page, vice-president and general manager of the Van Blerck Motor Co., of Monroe, Mich., comes as a distinct surprise to the aeroplane and marine trade. The wonderful resource and enthusiasm of Mr. Page have done much in raising the Van Blerck Company from a small organization, employing about twenty-five men, doing an annual business of about $50,000 to one which is rated at nearly the million mark. The work of Mr. Page has helped to popularize the high-powered, high-priced type of motor on which the Van Blerck Company specializes. We reckon it a loss to the general industry to have Mr. Page leave it for other fields of endeavor, but he naturally knows his own interests best, and we can but wish him the very best of success in his new undertaking.

Chapman Left $500,000 Estate.

Victor Emmanuel Chapman, killed in action at Verdun, left an estate of $500,000. Young Chapman, son of John Jay Chapman, was in the French flying corps. The Germans brought down his machine while he was carrying a basket of fruit to a wounded comrade.

Lawrence B. Sperry Makes 200-Mile Flight.

Lawrence B. Sperry, inventor and aviator, made a non-stop flight of 260 miles October 24 from Brant Rock, Mass., to Amityville, L. I., over a rough sea and with a wind of between twenty-five and forty miles an hour. Mr. Sperry started from Marblehead to fly to New York on Monday afternoon and landed at Brant Rock, about thirty miles from Boston, where he stayed overnight, as he figured that he could not make New York before dark.

He started from Brant Rock with Mr. Fowler, his mechanician, as passenger, at five minutes after one o'clock in the afternoon, and flew without stop to Amityville, where he arrived at ten minutes after four o'clock, having covered about 200 miles in 185 minutes. He used a 100-horsepower Curtiss flying boat, equipped with the Sperry automatic pilot, which controlled the machine during the storm through which he flew.

The start was witnessed by Lieutenant S. W. Fitzgerald, U. S. A., and other officers of the army and navy. Mr. Sperry carried fifty-five gallons of gasoline, weighing about 326 pounds. He also carried a complete set of scientific instruments, life preservers, lights, compass and an especially made chart, mounted on two rollers to facilitate handling it.

The flight demonstrated thoroughly the value of the gyroscopic automatic pilot, which automatically controls the aeroplane laterally, longitudinally and in direction. It also gave a thorough test to Mr. Sperry's synchronized drift set, consisting of a compass mechanically connected to a drift indicator, which indicates and also transmits to the compass the drift due to side winds. Mr. Sperry completed his flight the following day by flying to Governors Island. The distance from Amityville is thirty-two miles and he made it in less than thirty minutes, carrying two passengers, Miss Emily Rich, of 16 Central Park West and his mechanic.

Miss Rich is the secretary of the Art Students' League and a portrait painter and sculptress and is learning to fly under Mr. Sperry.

St. Petersburg Wants Aeroplane Ferry.

L. A. Whitney, secretary of the Board of Trade of St. Petersburg, Florida, is communicating with a number of aviators now, among them Johnny Green, who spent last season here with his airboat with a view to securing their presence this winter. Jack McGee, of Pawtucket, R. I., and Odrian Van Muffling, of Brooklyn, N. Y., are in communication with the Board of Trade.

Personal Pars.

Word has been received by cable of the marriage of Miss Katharine Van Rensselaer, younger daughter of Mr. and Mrs. William Sterne St. George of St. Louis, Mo., and Lieutenant Geoffrey Stuart O'Brian, of the Royal Flying Corps, younger son of James O'Brian, of Toronto, Canada, which took place on Oct. 12 in Christ Church, Doncaster, England.

Roy MacMillan, treasurer of the Rochester Model Aero Club, has constructed a biplane with which he will make experimental flights in the near future.

Porter H. Adams, of Boston, was married recently to Miss Irene Gourlay, of Toronto.

Lieutenant J. D. Von Holtzendorff of the army aviation school at San Diego had a narrow escape when the military aeroplane he was piloting crashed to earth near Carlsbad. The machine was partially wrecked, but the pilot escaped injury.

F. H. Rogers, of Cleburne, Texas, has constructed a biplane with which he hopes to make exhibition flights next season.

Frank Champion made flights at the Ottawa (Ill.) Fair last week.

Miss Ruth Law is filling dates in Kansas.

Prof. Clyde L. King, of the Wharton School of Finance and Commerce, of the University of Pennsylvania, in an address before the American Electric Railways Association, on the Million Dollar Pier, suggested the flying machine as a possible competitor of the electric railways of the country.

Alexander Brown, well known as a polo player, fell from his hydroaeroplane into the Delaware River at Essington, below Philadelphia, Oct. 24, and was drowned.

Brown, along with a number of other wealthy Philadelphians, had been making frequent flights at Essington. He was in the air on the previous night, and his fatal flight was to have been his last in a test for a license.

Louis Gertson made a great sensation in his loops and night flying over the heart of Richmond, for six days and nights, during the Richmond Centennial Exposition. Gertson flies at the National Farmers' and Live Stock Exposition at New Orleans, November 11th-19th, day and night.

Gertson leaves with his wife for Havana, Cuba, after the New Orleans date, for a much earned vacation.

Officers of Aero First Squadron Compile Remarkable List of Equipment for Guidance

The commanding officers and officers of the First Aero Squadron have compiled a valuable list of equipment for aero units in the Aviation Section, Signal Corps, of the Army. The list has been approved by Lieut. Col. George O. Squier, officer in charge of the Aviation Section.

Aerial Age will print this list beginning with next issue.

Bad Weather Delays New York Times' Chicago-New York Flight

Bad weather has delayed Carlstrom's Chicago-New York flight. Not that Carlstrom could not fly from Chicago to New York in bad weather—for he'd do it in a storm. But the flight is scheduled to be without a stop and in one day. These conditions make it necessary to have favorable weather. As we go to press the flight has been postponed for one day. Good luck!

Curtiss Co. Bonds Sold to Syndicate

An issue of $4,000,000 in ten-year 6 per cent convertible debenture bonds of the Curtiss Aeroplane and Motor Company has been purchased by a syndicate which will offer them soon on about a 6 per cent basis, although the price and convertible provisions have not been determined.

The issue is to retire outstanding obligations, as well as to furnish additional working capital and improvements. The company has three $1,000,000 notes maturing in January, April and July issued a year ago, when the company was organized. These will be retired. With this financing completed the company will have $4,000,000 debentures outstanding, $6,000,000 7 per cent cumulative preferred stock and 150,000 shares of common stock of no par value.

The bonds have been taken by Buffalo financiers, among them being interests who were prominent in the organization of the company, with the addition of others identified with the Marine National Bank and the Erie Finance Company of Buffalo, George F. Rand, president of the Marine National Bank, and John L. Clawson, vice-president and chairman of the board of that institution, have been named for places on the Curtiss board, as has Walter P. Cooke, president of the Bankers Trust Company of Buffalo.

The company is reported to have orders for between $6,000,000 and $7,000,000 worth of aeroplanes for 1917 delivery.

Gen. Mann New Militia Head

Brig.-Gen. William A. Mann, who commanded the army division with headquarters at Laredo, Tex., has been appointed chief of the Militia Bureau in the War Department, vacant by the death of Major Gen. Albert L. Mills.

He will assume his duties at once.

The Goodyear exhibits, which were shown in connection with the company's recent conference of branch and district managers. In the different booths Goodyear products were shown in their various stages of manufacture from the latex or "blood" of the rubber tree to the finished product.

NOMENCLATURE FOR AERONAUTICS

FOR the information of those interested in aeronautics the following nomenclature has been prepared by the National Advisory Committee for Aeronautics as a guide, with a view to eliminating the duplication of terms, the erroneous use of terms, and confusion of terms, and with a view to defining the principal terms which have come into use in the development of aeronautics. In the preparation of this nomenclature only those terms have been defined which are new and peculiar to this subject.

AERONAUTICAL NOMENCLATURE

Aerofoil: A thin wing-like structure, flat or curved, designed to obtain reaction upon its surfaces from the air through which it moves.

Aeroplane: See airplane.

Aileron: A movable auxiliary surface used for the control of rolling motion—*i.e.,* rotation about the fore and aft axis.

Aircraft: Any form of craft designed for the navigation of the air—airplanes, balloons, dirigibles, helicopters, kites, kite-balloons, ornithopters, gliders, etc.

Airplane: A form of aircraft heavier than air which has wing surfaces for sustentation, with stabilizing surfaces, rudders for steering, and power plant for propulsion through the air. The landing gear may be suited for either land or water use.

Pusher.—A type of airplane with the propeller or propellers in rear of the wings.

Tractor.—A type of airplane with the propeller or propellers in front of the wings.

Air-Speed Meter: An instrument designed to measure the velocity of an aircraft with reference to the air through which it is moving.

Altimeter: An instrument mounted on an aircraft to continuously indicate its height above the surface of the earth.

Anemometer: An instrument for measuring the velocity of the wind or air currents with reference to the earth or some fixed body.

Angle:

Of attack.—The angle between the direction of the relative wind and the chord of an aerofoil, or the fore and aft axis of a body.

Critical.—The angle of attack at which the lift is a maximum.

Gliding.—The angle the flight path makes with the horizontal when flying in still air under the influence of gravity alone.

Aspect Ratio: The ratio of spread to chord of an aerofoil.

Axes of an Aircraft: Three fixed lines of reference; usually centroidal and mutually rectangular.

The principal longitudinal axis in the plane of symmetry, usually parallel to the axis of the propeller, is called the fore and aft axis (or longitudinal axis); the axis perpendicular to this in the plane of symmetry is called the vertical axis; and the third axis, perpendicular to the other two, is called the athwartship axis (or transverse or lateral axis). In mathematical discussions the first of these axes is called the X axis, the second the Z axis, and the third the Y axis.

Ballonet: A small balloon within the interior of a balloon or dirigible for the purpose of controlling the ascent or descent, and for maintaining pressure on the outer envelope to prevent deformation. The ballonet is kept inflated with air at the required pressure, under the control of a blower and valves.

Balloon: A form of aircraft comprising a gas bag and a car, whose sustentation depends on the buoyancy of the contained gas, which is lighter than air.

Captive.—A balloon restrained from free flight by means of a cable attaching it to the earth.

Kite.—An elongated form of captive balloon, fitted with tail appendages to keep it headed into the wind, and deriving increased lift due to its axis being inclined to the wind.

Bank: To incline an airplane laterally—*i.e.,* to rotate it about the fore and aft axis. Right bank is to incline the airplane with the right wing down.

Banking Rudder: See Aileron.

Barograph: An instrument used to record variations in barometric pressure. In aeronautics the charts on which the records are made are prepared to indicate altitudes directly instead of barometric pressure.

Biplane: A form of airplane in which the main supporting surface is divided into two parts, one above the other.

Body of an Airplane: A structure, usually inclosed, which contains in a stream-line housing the power plant, fuel, passengers, etc.

Cabré: A flying attitude in which the angle of attacks is greater than normal; tail down; down by the stern—tail low.

Camber: The convexity or rise of a curve of an aerofoil from its chord, usually expressed as the ratio of the maximum departure of the curve from the chord as a fraction thereof. "Top Camber" refers to the top surface of an aerofoil, and "Bottom Camber" to the bottom surface; "Mean Camber" is the mean of these two.

Capacity:

Lifting.—The maximum flying load of an aircraft.

Carrying.—Excess of the lifting capacity over the dead load of an aircraft, which latter includes structure, power plant, and essential accessories.

Carrying Capacity: See Capacity.

Center: The point in which a set of effects is assumed to be accumulated, producing the same effect as if all were concentrated at this point.

Of buoyancy.—The center of gravity of the fluid displaced by the floating body.

Of pressure of an aerofoil.—The point on the chord of an element of an aerofoil, prolonged if necessary, through which at any instant the line of action of the resultant air force passes.

Of pressure of a body.—The point on the axis of a body, prolonged if necessary, through which at any instant the line of action of the resultant air force passes.

Chord:

Of an aerofoil section.—A right line tangent to the under curve of the aerofoil section at the front and rear.

Length.—The length of the chord is the length of the aerofoil section projected on the chord, extended if necessary.

Controls: A general term applying to the means provided for operating the devices used to control speed, direction of flight and altitude of an aircraft.

Critical Angle: See Angle, Critical.

Décalage: An increase in the angular setting of the chord of an upper wing of a biplane with reference to the chord of the lower wing.

Developed Area of a Propeller: A layout of the area of a propeller blade designed to represent the total area of the driving face, in which the elements of area are developd as if unfolded onto the plane of the drawing (necessarily an approximation on definite assumptions, as no true development of the helix can be made).

Dirigible: A form of balloon, the outer envelope of which is of elongated form, provided with a propelling system, car, rudders, and stabilizing surfaces.

Nonrigid.—A dirigible whose form is maintained by the pressure of the contained gas assisted by the car-suspension system.

Rigid.—A dirigible whose form is maintained by a rigid structure contained within the envelope.

Semirigid.—A dirigible whose form is maintained by means of its attachment to an exterior girder construction containing the car.

Disk Area of a Propeller: The total area of the disk swept by the propeller tips.

Diving Rudder: See elevator.

Dope: A general term applied to the material used in treating the cloth surface of airplane members to increase strength, produce tautness, and act as a filler to maintain airtightness; usually of the cellulose type.

Drag: The total resistance to motion through the air of an air craft—*i.e.,* the sum of the drift and head resistance.

Drift: The component of the resultant wind pressure on an aerofoil or wing surface parallel to the air stream attacking the surface.

Elevator: A hinged surface for controlling the longitudinal attitude of an air craft—*i.e.,* its rotation about the athwartship axis.

Engine, Right or Left Hand: The distinction between a right-hand and a left-hand engine depends on the rotation of the output shaft, whether this shaft rotates in the same direction as the crank or not. A right-hand engine is one in which, when viewed from the output shaft end, the shaft is seen to rotate anticlockwise.

Entering Edge: The foremost part of an aerofoil.

Fins: Small planes on air craft to promote stability; for example, vertical tail fins, horizontal tail fins, skid fins, etc.

Flight Path: The path of the center of gravity of an aircraft with reference to the air.

Float: That portion of the landing gear of an aircraft which provides buoyancy when it is resting on the surface of the water.

Fuselage: See body.

Gap: The distance between the projections on the vertical axis of the entering edges of an upper and lower wing of a biplane.

Glide: To fly without power.

Glider: A form of aircraft similar to an airplane, but without any power plant.

When utilized in variable winds it makes use of the soaring principles of flight and is sometimes called a soaring machine.

Gliding Angle: See Angle, Gliding.

Guy: A rope, chain, wire, or rod attached to an object to guide or steady it, such as guys to wing, tail, or landing gear.

Head Resistance: The total resistance to motion through the air of all parts of an air craft not a part of the main lifting surface. Sometimes termed "parasite resistance."

Helicopter: A form of aircraft whose support in the air is derived from the vertical thrust of large propellers.

Inclinometer: An instrument for measuring the angle made by any axis of an aircraft with the horizontal.

Keel Plane Area: The total effective area of an aircraft which acts to prevent skidding or side slipping.

Kite: A form of aircraft without other propelling means than the towline pull, whose support is derived from the force of the wind moving past its surface.

Kite Balloon: See Balloon, kite.

Landing Gear: The under structure of an aircraft designed to carry the load when resting on, or running on, the surface of the land or water.

Lateral Stability: See Stability, lateral.

Leading Edge: See Entering edge.

Leeway: The angular deviation from a course over the earth, due to cross currents of wind.

Lift: The component of the force due to the air pressure of an aerofoil, resolved perpendicular to the flight path in a vertical plane.

Lift Bracing: See Stay.

Lifting Capacity: See Capacity, lifting.

Load, Full: See Capacity, lifting.

Reserve (or useful).—See Capacity, carrying.

Loading: See Wing loading.

Longitudinal: A fore-and-aft member of the framing of an airplane body, or of the floats, usually continuous across a number of points of support.

Longitudinal Stability: See Stability.

Metacenter: The point of intersection of a vertical line through the center of gravity of the fluid displaced by a floating body when it is tipped through a small angle from its position of equilibrium and the inclined line which was vertical through the center of gravity of the body when in equilibrium. There is, in general, a different metacenter for each type of displacement of the floating body.

Monoplane: A form of airplane whose main supporting surface is disposed as a single wing on each side of the body.

Motor: See Engine.

Nacelle: See Body.

Natural Stability: See Stability.

Nose Dive: A dangerously steep descent, head-on.

Ornithopter: A form of aircraft deriving its support and propelling force from flapping wings.

Pitot Tube: A tube with an end open square to the fluid stream; used as a detector of an impact pressure. More usually associated with a concentric tube surrounding it, having perforations normal to the axis for indicating static pressure. The velocity of the fluid can be determined from the difference between the impact pressure and the static pressure. This instrument is often used to determine the velocity of an aircraft through the air.

Propeller:

Developed area of.—See Developed area of a propeller.

Disk area of.—See Disk area of a propeller.

Right-hand.—One in which the helix is right-handed.

Pusher: See Airplane.

Pylon: A marker of a course.

Race of a Propeller: The air stream delivered by the propeller.

Rib: See Wing.

Right (or Left) Hand:

Engine.—See Engine.

Propeller.—See Propeller, right-hand.

Rigid Dirigible: See Dirigible, rigid.

Rudder: A hinged or pivoted surface, usually more or less flat or stream lined, used for the purpose of controlling the attitude of an aircraft about its vertical axis when in motion.

Side Slipping: Sliding toward the center of a turn. It is due to excessive amount of bank for the turn being made, and is the opposite of skidding.

Skidding: Sliding sideways in flight away from the center of the turn. It is usually caused by insufficient banking in a turn, and is the opposite of side slipping.

Skids: Long wooden or metal runners designed to prevent nosing of a land machine when landing or to prevent dropping into holes or ditches in rough ground. Generally designed to function should the wheels collapse or fail to act.

Slip: This term applies to propeller action and is the difference between the actual velocity of advance of an aircraft and the speed calculated from the known pitch of the propeller and its number of revolutions.

Soaring Machine: See Glider.

Spread: The maximum distance laterally from tip to tip of an airplane wing.

Stability: The quality of an aircraft in flight which causes it to return to a condition of equilibrium when meeting a disturbance. (This is sometimes called "Dynamical stability.")

Directional.—Stability with reference to the vertical axis.

Inherent.—Stability of an aircraft due to the disposition and arrangement of its fixed parts.

REGARDING AERONAUTIC NOMENCLATURE

By HENRY WOODHOUSE

REPORT NO. 9 of the National Advisory Committee on Aeronautics, dealing with nomenclature for aeronautics, which is issued for the consideration of the aeronautic authorities should receive careful consideration from not only those interested in aeronautics, but also from editors of newspapers and magazines.

Some of the new terms suggested in this report will cause discussion. "Airplane," which is submitted to take the place of "aeroplane" received a hot resention from the technical contingent in England, when Lord Northcliffe's papers proposed it.

If "airplane" should be adopted, should "aeronautics," "aerodynamics," and "aerofoil" remain? And what about "hydroaeroplane," "aerostatic," and "aero squadron?"

Then there is "aerodrome," which our beloved pioneer, Dr. Samuel P. Langley, used for his aeroplane, but which has been used for aeronautic fields of late years. Who will dare to propose "airdrome?" And would not "airmechanics" make us think of mechanicians rather than of aeromechanics?

As "aeroplane" has been in use exclusively for years and the change would effect so many relative terms, our newly adopted national gospel of standardization will forbid adopting "airplane" unless it is found to be a distinct improvement over "aeroplane."

We should, of course, simplify and anglicize our aeronautic terms as much as possible. Let us anglicize, by all means, but let us not forget that "automobile," "chassis" and "chauffeur" have not been anglicized.

On the other hand, usage has made "Air Service" a desirable term. Usage cannot, however, perpetuate "Aviation Section" in a case where, as at present in Washington, the Aviation Section of the Signal Corps is taking care of both lighter and heavier than air aircraft. It will have to be "Air Service," following the British precedent, or "Aeronautic Service" with the "Aviation Section" and "Aerostatic Section," as branches. The latter can be made "Lighter-than-air," but can that be made to include those Zeppelins which are actually **as heavy** as the air?

There will be discussed whether "airmen" is better than "aviator"; "airwoman" better than "aviatrice" or "aviatrix"; "body" better than "fuselage"; "gliding" better than "volplaning"; "shed" better than "hangar," etc., etc. We have used "aviator" for the man who pilots an aeroplane, "balloonist" for the man who pilots a balloon, just as we have used "aviating" and "ballooning."

"Aeroplaning" was never to our liking; nor was "sky-pilot."

"Airman" we have often seen applied to both the pilot and the passenger. There has been no special term for the pilot of a dirigible in English—we have had so little experience with dirigibles.

There is one term that the writer only used at the time when Santos-Dumont was experimenting with balloons and dirigibles in Paris in 1899-1903, but always shunned thereafter. That was "aeronaut." The reason is that people were all too prone to pronounce it "aeronut." And we also plead guilty to having eliminated the dieresis from the second vowel of aëro. This was done for convenience. Most of us were always apt to forget the two dots on the second vowel, and so were the printers. "Hydroaeroplane" was eliminated for the sake of standardization. "Aerohydroplane" was introduced by the defunct weekly, *Aero and Hydro*—and died with it.

We have, it is true, little regard for tradition in aeronautics, but we have great regard for the economic value of standardization and considerable sentiment. The works of Langeley, Eiffel, Chanute, Lilienthal and other pioneers are classics. What Langley, the Wrights, Curtiss, Eiffel and other pioneers have done has been told in certain terms which have been generally adopted. To make radical changes in aeronautic terminology purely to have something different would mean confusion and, although not intended, disrespect to our pioneers.

Lexicographers made several attempts at compiling aeronautic dictionaries in 1910-12, but they did not have the necessary knowledge of aeronautics and aeronautic tradition, and the result was far from practical.

The National Advisory Committee on Aeronautics is in a unique position to do fundamental work of this kind. Authorized by Congress and with ample funds at its disposal, it can form a sub-committee of authorities to consider the dictionaries of aeronautic terms prepared by British, French, German and Italian authorities which, while being far from complete, afford a good foundation.

Report No. 9 gives about 115 terms. The dictionary of the Aeronautical Society of Great Britain, issued in 1910-1914, gave several hundred more. The writer has been working on an illustrated dictionary of aeronautic terms and historic dates and has figured on about 2,500 terms and as many historic dates, which would include all the important experiments made by the pioneers. I will gladly relinquish the privilege of doing it in favor of the National Advisory Committee on Aeronautics.

With a committee of experts the compilation of such a dictionary would not be hard and would take but a short time. The proofs could then be submitted to editors of the lay press and magazines for suggestions and ideas on simplifying and standardizing. The editors could be relied upon to ask for clear definitions and explanations. And they would all welcome a copy of the finished product for their office.

This reminds me of early adventures in connection with aeronautic terminology. In 1911-12 a name was wanted for the official publication of the Aero Club of America, and we asked several hundred people in the newspaper and magazine fraternity to make suggestions. I had personally selected Aerial Age, *Aeronautic Review* and *Aero World.* These names were considered too technical and hard by every one of the newspaper and magazine people, who proposed such popular names as *Flying, The Airman, The Air Scout, The Airgoname,* etc. The managing editor of a national magazine suggested *Flying,* and this name became a favorite. The technical people pointed out that nothing actually flies in aeronautics, that we have not yet developed the aeroplane with flapping wings, and the dirigible navigates the air, while balloons drift. But the other side held that in the mind of 999 people out of a thousand aircraft do fly, and the name *Flying,* implying the action of human flight, is a live name. A few aeronautic enthusiasts felt that Aerial Age was a much more substantial name, and during the discussion it was pointed out that in its prospective developed stage aircraft promised to revolutionize warfare, economics and sociology, therefore the name Aerial Age would make people try to visualize the Aerial Age to come. But the other side very aptly pointed out that whereas most people (at that time) did not even believe that aeroplanes were capable of such development as would enable them to remain in the air for a few hours, and the possible value of aeroplanes for military purposes was still a matter of opinion, it was too much to ask people to try to visualize an age when aircraft would be applied for both military and utilitarian purposes. So *Flying* was adopted.

A year or so before that I had an experience which proved to be quite beneficial to me. A certain popular magazine asked me to write an article presenting the status of aviation in a popular way. I included in this article an account of the important flights of the year and a definition of the technical developments that had taken place and the cardinal problems that were to be solved to make aeroplanes safer, steadier and of greater value. Among the flights of the year there had been John Moissant's flight from Paris to London in which he had carried his mechanic and a kitten presented to him by an admirer. I mentioned this flight briefly and left out the kitten, feeling that it detracted somehow from the dignity of the article. When I mentioned this to the editor he stated that it was important to include it. I disagreed until he pointed out that aviation's greatest need was to get people interested in it and that 950 people out of a thousand would read the account of Moissant's flight and try to visualize the aeroplane flying across the English Channel with the mechanic and the kitten on board, and that would impress the idea of flight in their mind as probably nothing else would, and they would thereby become interested in the subject and want to read more about it. On the other hand, he pointed out, the account of the technical improvements that had been made and the definitions of the cardinal problems to be solved, which appeared so important to me, would probably be understood by fifty people out of a thousand and a fewer number would grasp the importance of the subject.

I had to admit that he was right. I knew that what was needed more than anything else to develop aeronautics was public interest and public support, and that without it the development of aeronautics would be greatly retarded. So the kitten went into the story. In selecting a dozen or so photographs for illustrating the article we went through the same discussion. There were about 200 photographs to select from and some of them illustrated most strikingly some technical points which I felt important to bring out. But he pointed out that the best judge in selecting the photographs was a young lady, one of his assistants, who did not know a thing about aeronautics, therefore would not be prejudiced in favor of technical details, but would select photographs expressing the idea of human progress in actual flying.

All of which suggests that in making up a dictionary of aeronautic terms it may be well to give preference to terms that already have an aeronautic connection. For instance, the word "hangar" is clearly associated with aeronautics as a place for housing aircraft, whereas "shed" would not especially mean that the structure was built for aeronautical purposes.

If changes are to be made, now is the time. The aeronautic movement is still very much like a big family, and the minds are plastic and ready to accept changes. But it will not be so much longer. The American aeronautic industry will have to take care of $50,000,000 worth of business in the coming twelve months, and if the increase next year will be proportionate to the increase in the past year, it will increase to $300,000,000! If only half of that increase takes place, the aeronautic industry will still be large enough to make it hard to put changes into effect. So let us have them now.

Lateral.—Stability with reference to the longitudinal (or fore and aft) axis.

Longitudinal.—Stability with reference to the lateral (or athwartship) axis.

Stabilizer: See Fins.

Mechanical.—Any automatic device designed to secure stability in flight.

Stagger: The amount of advance of the entering edge of the upper wing of a biplane over that of the lower; it is considered positive when the upper surface is forward.

Stalling: A term describing the condition of an airplane which from any cause has lost the relative speed necessary for steerageway and control.

Statoscope: An instrument to detect the existence of a small rate of ascent or descent, principally used in ballooning.

Stay: A wire, rope, or the like, used as a tie piece to hold parts together, or to contribute stiffness; for example, the stays of the wing and body trussing.

Step: A break in the form of the bottom of a float.

Stream-line Flow: A term in hydromechanics to describe the condition of continuous flow of a fluid, as distinguished from eddying flow where discontinuity takes place.

Stream-line Shape: A shape intended to avoid eddying or discontinuity and to preserve stream-line flow, thus keeping resistance to progress at a minimum.

Strut: A compression member of a truss frame; for instance, the vertical members of the wing truss of a biplane.

Sweep Back: The horizontal angle between the lateral (athwartship) axis of an airplane and the entering edge of the main planes.

Tail: The rear portion of an aircraft, to which are usually attached rudders, elevators, and fins.

Tail Fins: The vertical and horizontal surfaces attached to the tail, used for stabilizing.

Thrust Deduction: Due to the influence of the propellers, there is a reduction of pressure under the stern of the vessel which appreciably reduces the total propulsive effect of the propeller. This reduction is termed "Thrust deduction."

Tractor: See Airplane.

Trailing Edge: The rearmost portion of an aerofoil.

Triplane: A form of airplane whose main supporting surfaces are divided into three parts, superposed.

Truss: The framing by which the wing loads are transmitted to the body; comprises struts, stays, and spars.

Velometer: See Air-speed metor and anemometer.

Vol-pique: See Nose dive.

Vol-plane: See Glide.

Wake Gain: Due to the influence of skin friction, eddying, etc., a vessel in moving forward produces a certain forward movement of the fluid surrounding it. The effect of this is to reduce the effective resistance of the hull, and this effect, due to the forward movement of the wake, is termed the "wake gain."

In addition to this effect the forward movement of this body of fluid reduces the actual advance of the propeller through the surrounding medium, thereby reducing the propeller horsepower.

Warp: To change the form of the wing by twisting it, usually by changing the inclination of the rear spar relative to the front spar.

Wings: The main supporting surfaces of an airplane.

Wing Loading: The weight carried per unit area of supporting surface.

Wing Rib: A fore and aft member of the wing structure used to support the covering and to give the wing section its form.

Wing Spar: An athwartship member of the wing structure resisting tension and compression.

Yaw: To swing off the course about the vertical axis, owing to gusts or lack of directional stability.

Angle of.—The temporary angular deviation of the fore and aft axis from the course.

MODERN PROCESSES FOR THE TECHNICAL PRODUCTION OF HYDROGEN FOR DIRIGIBLE AIRSHIPS AND BALLOONS

By HARRY L. BARNITZ, Ph. G.

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Part I of Three Series.

[*In the following article the writer gives valuable data covering knowledge gained by* 16 *years' experience specializing in research work on the Technical Production and Application of Hydrogen. His long association in this field has made his counsel much sought by many of the largest industries in this and foreign countries. Mr. Barnitz has installed many plants here and abroad and is leading authority in the United States on the production and application of hydrogen.*—Ed.]

At the present time much discussion is taking place regarding what our government should do in the development of dirigible airships and various types of balloons, especially kite balloons. Up to now little, if anything, has been done in this branch of aeronautics. The army and navy have only a few spherical balloons; the number is so limited that they would not be considered of any importance.

The European war has clearly demonstrated that our Government must soon develop this branch of aeronautics and must now have large appropriations for airships and balloons, as well as hydrogen plants.

While airships and balloons are being considered, the question of hydrogen production to inflate them, seems to be entirely overlooked. Our Government has two hydrogen plants for aeronautics. Both plants are electrolytical. These plants are located at Omaha, Neb., and Pensacola, Fla. The Omaha plant was built about seven years ago and has not been in operation for five or six years. It is doubtful if this plant could be put in operation. Due to deterioration which has taken place in the generating apparatus after remaining inoperative such a length of time, it certainly would not have the efficiency of apparatus of later types which have many improvements and are of greater efficiency.

The Pensacola plant is of recent construction and is equipped with the latest electrolytical generating apparatus but the capacity is so small—only 21,000 cubic feet in twenty-four hours—hardly sufficient for one fair-sized balloon.

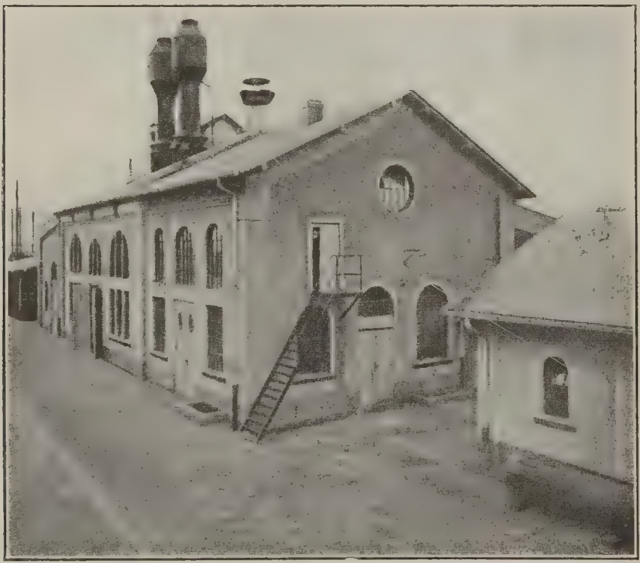


Fig. 1—Hydrogen gas works air ship depot, Koenigsberg.

Germany is using dirigible airships requiring 850,000 cubic feet of hydrogen to inflate them. Both England and France have been severely handicapped by not having a ready available supply of hydrogen, and by their non-development of dirigible airships and balloons.

Balloons and dirigibles would be of little or no value if a large and ready available supply of hydrogen at all times is not obtainable.

Therefore, we must consider the problem of the technical production of hydrogen on a large scale, and means of delivering it to any point where it is required for inflation of dirigibles or balloons. An extremely important factor is the selection of a proper generating plant. While England and France have given the production of hydrogen some slight consideration, it remained for Germany to develop the technical production of hydrogen to its highest and present state of perfection for the aeronautical field.

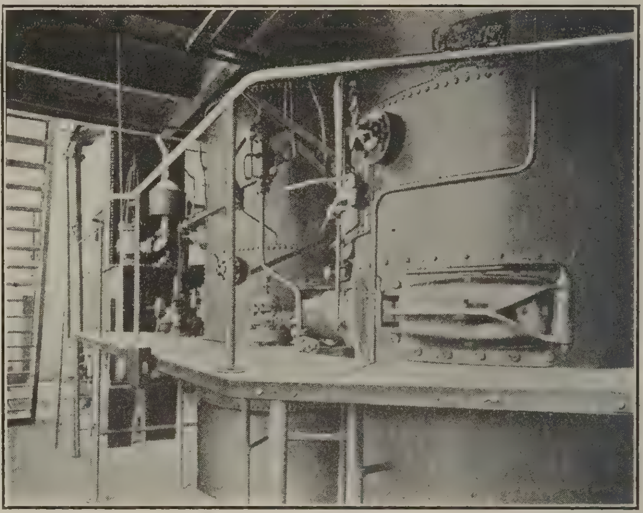


Fig. 2—Hydrogen gas generator, photograph taken before the war.

Prior to 1907, little importance was given to the production of hydrogen; but with the development of the dirigible airship in Germany, it was imperative that hydrogen be cheap and easily obtainable in great volumes.

Hydrogen produced by Silicon Aluminum or other similar processes, is now obsolete, due to the perfection of later processes brought forward by the Germans—especially in one process known as the Messerschmitt Contact Process, and one process perfected by the French—namely, electrolytical.

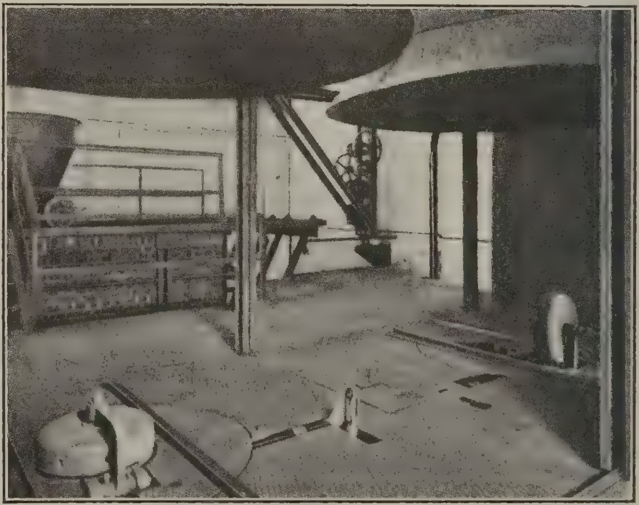


Fig. 3—Working stage above hydrogen gas generator, photograph taken before the war.

The Germans have installed during the war fourteen Messerschmitt contact installations and several other large installations are in course of erection and have adopted this process to the exclusion of all other processes, for large production for stationary plants. They have invested $20,000,000 since the war, on installations of the Messerschmitt contact process.

These plants range in capacity from 3,500 cubic feet per hour to 21,000 cubic feet per hour.

Some small electrolytic plants have also been installed, where moderate quantities only of hydrogen are required for observation work on board war vessels. And in vicinities where electric current is available, another process that gave great promise, known as the Linde-Frank-Caro process, which the Germans had worked out just prior to the present war, the writer recently learned, has been discarded by them on account of the excessive amount of auxiliary equipment required and the impurities in the hydrogen.

No information has been given out on this process during the war until recently. Details of this process and other modern processes (which follow later in this article) are noted only as a matter of interest, and could not be considered practical for adoption in aeronautical work, according to reports received by the writer from responsible authorities in Germany.

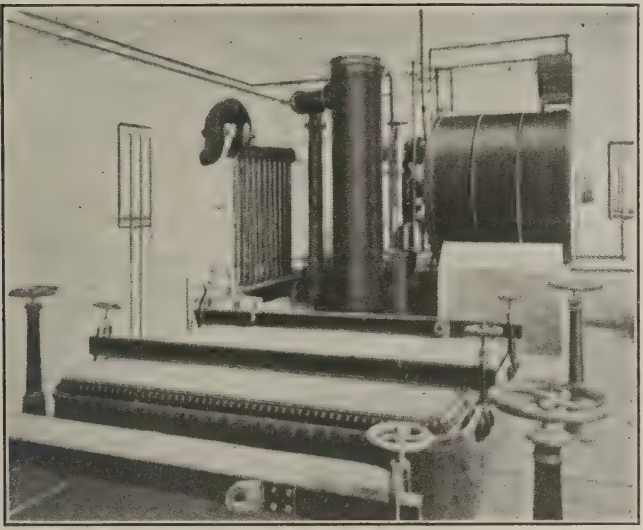


Fig. 4—Purifiers, final condenser and gasmeter.

The two processes of first importance to be considered are Messerschmitt contact process and electrolytical—other processes will follow in order of importance.

The Messerschmitt Contact Process for the production of Hydrogen.

Reprinted from *Metallurgical & Chemical Engineering,* Vol. XV, No. 8, Oct. 15/16. By Harry L. Barnitz.

The production of hydrogen after the system of Dr. Anton Messerschmitt is based on the so-called iron contact method.

This method is based on the fact that if steam is passed over red-hot iron it is decomposed into its elementary constituents, hydrogen and oxygen. The oxygen is taken up by the iron under the formation of iron oxide, while the hydrogen is liberated. The resulting iron oxide can be reconverted into iron by treating it with reducing gases, to which they will give oxygen under formation of carbon dioxide and steam. The process is therefore reversible.

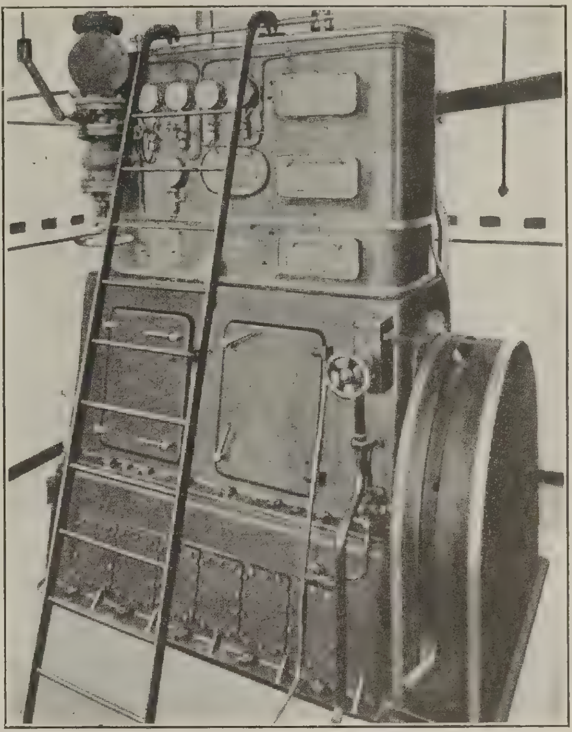


Fig. 5—Vertical compressor.

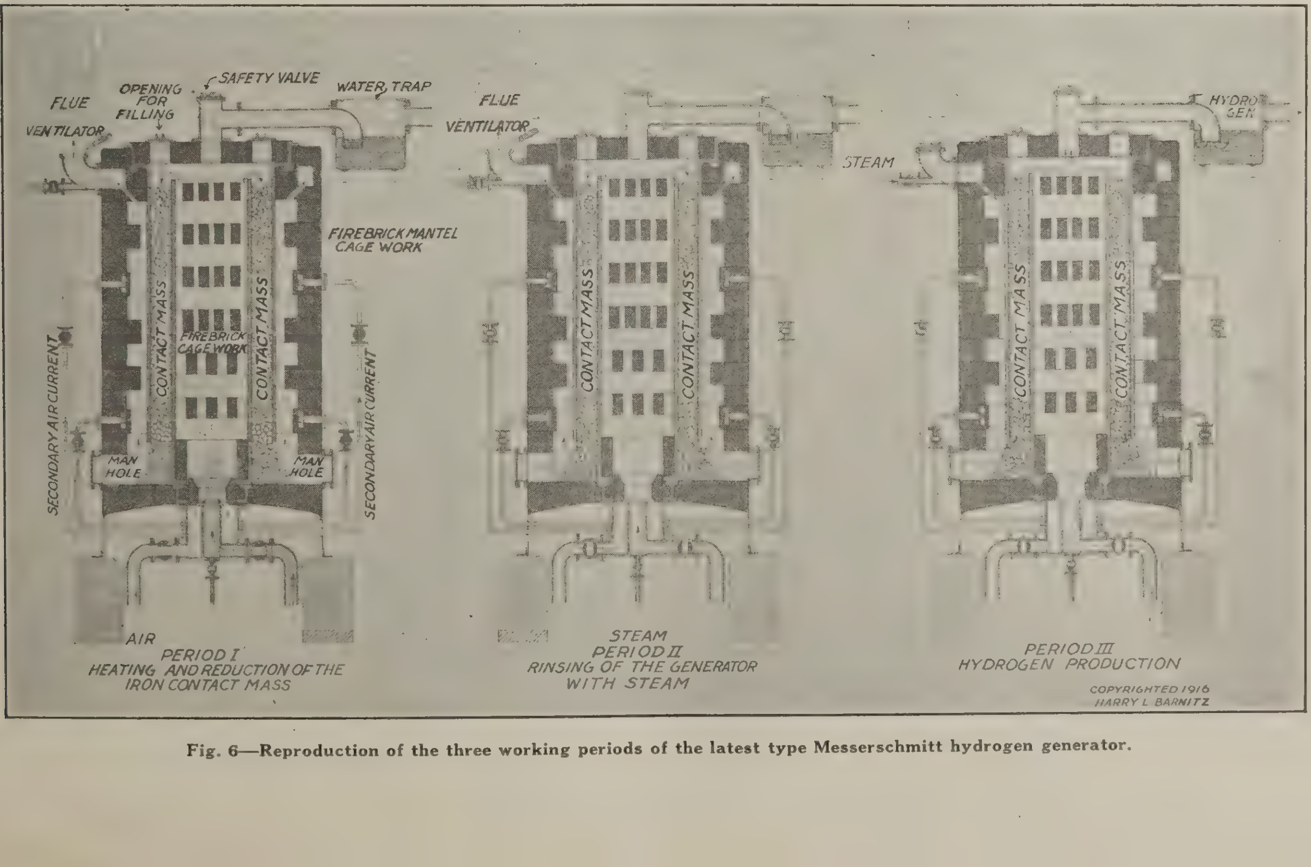


Fig. 6—Reproduction of the three working periods of the latest type Messerschmitt hydrogen generator.

The iron, theoretically speaking, is not consumed. It serves only as a contact mass, as in its glowing condition it is periodically oxidized with steam and again reduced by being treated with special gases. A gas with reducing action is carbon monoxide or hydrogen itself. Therefore, for the reduction such technical gases can be applied which contain these elements in greater quantities, for instance, generator gas, water gas, or coal gas, etc.

Especially adaptable to reduction is coke gas, as it is composed largely of carbon monoxide and hydrogen. These gases can be produced at very low cost, as the actual material necessary is only coal, coke and steam.

Water gas, for instance, is obtained by passing steam of corresponding temperature through a generating box containing superheated coke. The oxygen of the steam combines with the carbon of the coke, forming carbon monoxide, and the hydrogen is liberated.

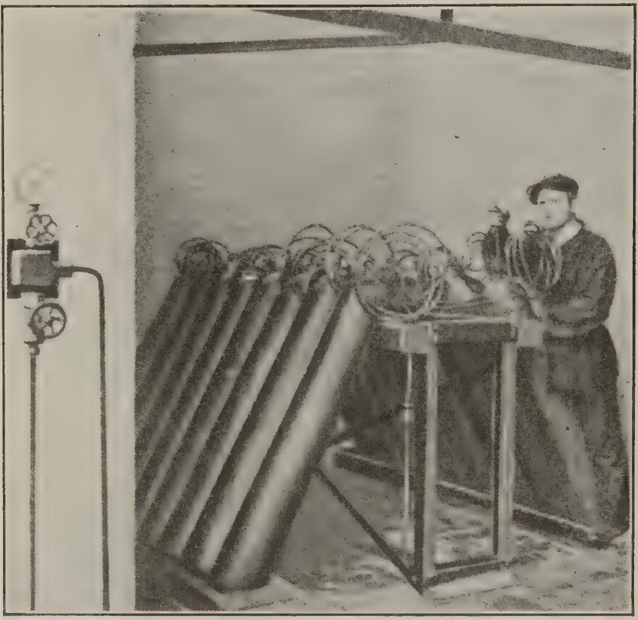


Fig. 7—Cylinder filling.

The following equation explains the reaction:

$$C + H_2O = CO + H_2.$$

The water gas is theoretically a mixture of equal parts of carbon monoxide and hydrogen; practically it contains carbon hydrates and impurities as sulphur combinations, nitrogen and carbon dioxide. For the technical production of water gas, the well known periodically working generators are used. Steam is passed for a while over glowing coke, and the water gas formed is passed through a purifying apparatus into a storage tank. (This is the gas period.)

As the process of forming the gas consumes a great deal of heat, the temperature of the coke is reduced, therefore after about ten minutes the steam supply must be interrupted and air has to be blown through a ventilator into a generator and through stimulated combustion of a part of the coke the required heat is restored. (This is the blow period.)

The products formed by this combustion are removed through a diverting ventilator so that they cannot mix with the gas.

The production of water gas is distinguished by its great simplicity. The generators are extremely reliable to operate, require only limited attention, and can be built for all requirements in units of a generating capacity of 3,500 cubic feet per hour.

The main advantage of the iron contact method is that the only materials required for the production of hydrogen are coke and water, materials easily and cheaply obtained anywhere. The chemical change in the production of hydrogen by the iron contact method and the application of water gas as reducing agent, are explained by the following formulas.

1. Oxidation period:

$$Fe + H_2O = FeO + H_2.$$

2. Regeneration:

$$2FeO + CO + H_2 = 2Fe + CO_2 + H_2O.$$

These two periods are alternating, and each only of such duration as to give chemical reaction in a sufficiently short time. The contact mass must at the same time be kept by heating at such a temperature as is most suitable for the process. This temperature is about 700 deg. to 800 deg. C.

The iron contact method as well as the use of iron or iron ore as contact mass, also the use of water gas or similar gases for reduction of same, are well known. A number of old extinct patents are existing, and a series of suggestions have been made even lately regarding the practical development of this system, some of which have been partly applied in practice. But many difficulties have been encountered in technical production.

It is extremely difficult to obtain an even degree of heat of the contact mass and regulate exactly the high temperature required for the completion of the process quickly without overheating the mass, which under such conditions would cake together or even melt.

The retort ovens which have been constructed for generating hydrogen are difficult to handle, and proper conditions hard to establish, the contact mass in iron retorts being heated from outside.

Another difficulty encountered in continued generation of hydrogen are the impurities accumulating in the heat and reduction gases. These impurities will form a layer on the surface of the contact mass thereby lowering its progress of reaction by gradual contamination, besides contaminating the produced hydrogen.

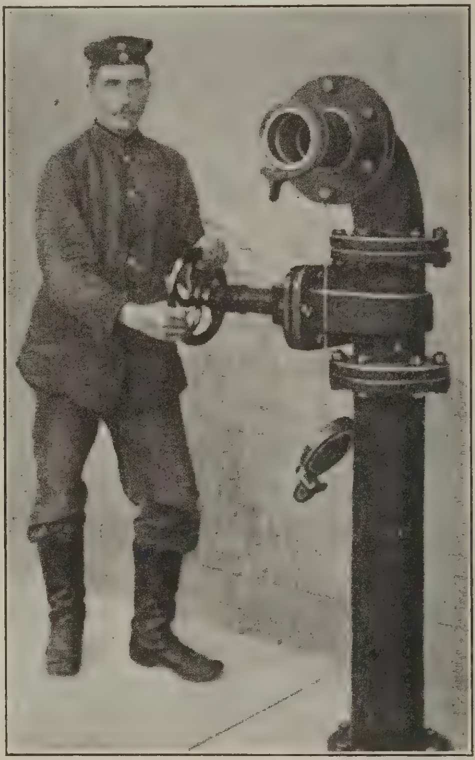


Fig. 8—Stand pipe for filling air ships.

In the patented system of Dr. Messerschmitt these difficulties have been overcome. Its fundamental principles are that the hydrogen gas is generated in a generator shaft with separate compartments for heat and contact mass, which are connected in such a way that heating, process of reduction, and generating of gas take place in the interior of one and the same apparatus.

Fig. 6 is a projective reproduction of the three working periods of a hydrogen generator of the Messerschmitt system, explaining the construction of the generator and its working methods.

In a generator shaft, lined with fire brick, two iron cylinders are built in, in a vertical position. The inner cylinder rests on the floor of the generator. Between these cylinders the iron contact mass is stored. In the interior of the inner smaller cylinder there is cagework of fire brick which serves as storage of heat. The larger cylinder is also surrounded by fire brick cagework which is incorporated in the construction of the outside fire brick mantel of the generator. For the heating of the cagework, and for the heating and reduction of the contact mass, reducing gases and air are introduced from underneath into the interior part of the generator, the air in such volume as not to be sufficient for complete combustion of the heating and reducing gases.

The combustibles and the parts of the gas not consumed rise upwards in the inner cagework, pass through the contact mass downward into the outer cagework where the rest of the gas is consumed by additional or secondary air current, rising again upwards to pass through the flue into the open. The heat is thereby imparted to the cagework, at the same time heating and producing the contact mass. The duration of this heating and reduction process is about 20 minutes. After this the supply of heat, reduction gas and air is shut off and steam is introduced from underneath into the generator.

The steam and the carbon dioxide generated from the contact mass are driven out through the flues.

As soon as hydrogen gas escapes with the steam, which can be easily detected by the forming flame, the supply of gas and air is discontinued, and at the same time the ventilator leading to the flue is closed. The so-called rinsing or steaming period now begins, which requires only a few seconds, steam being passed through the apparatus as shown in the second diagram.

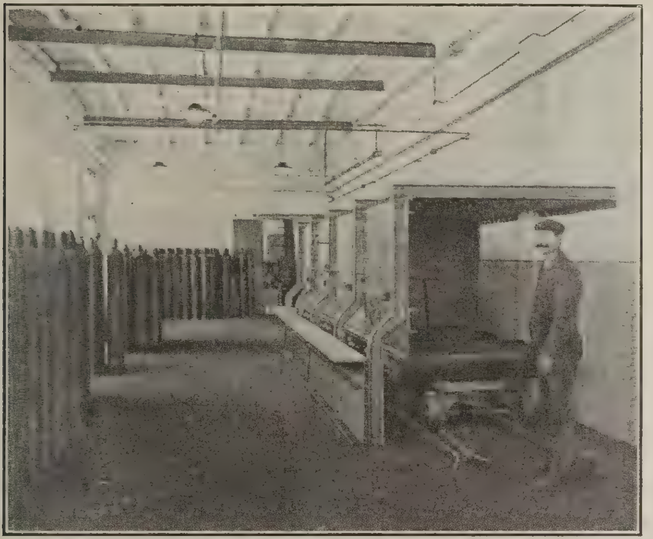


Fig. 9—Cylinder filling with protection chamber at Borsigwalde.

Then the third period begins. Steam is passed from above into the outer cagework of the generator, and the actual hydrogen production period begins. The steam coming into contact with the glowing contact mass which is now reduced iron is decomposed and hydrogen is liberated with the formation of iron oxide.

The outflow of the generated hydrogen takes place on the top from the middle of the generator into a chamber with a water trap. From there the hydrogen passes through a purifier into the hydrogen gas holder and is then compressed in cylinders or storage tanks. The gas period is of about 15 minutes' duration.

The process is then repeated by again introducing heating and reduction gases and air into the generator. The working method is therefore a periodical one.

The great amount of heat required during the heating and reduction periods is imparted to the contact mass and stored in the fire brick cagework. During the gas period this heat is taken up, the fire brick cagework imparting its heat to the contact mass; besides the introduced steam which passes over the cagework becomes highly superheated and the most effective temperature for reaction is reached. The proper temperature required for this process is between 700 deg. and 800 deg. C., as was mentioned before. This temperature is easily reached in this generator.

Overheating, which would impair the life of the contact mass and the other materials is easily avoided. By the construction of the hydrogen generator of this system an even temperature of the contact mass is obtained without danger of overheating, while the required temperature is quickly imparted.

The total consumption of fuel required for the heating and reduction gases and steam used in the production of hydrogen is very low. The actual cost of the hydrogen gas is governed by the cost of coke and other materials and the size of the installed apparatus. The cost, taken from one plant installed in the United States, averages 40 to 45 cents per 1,000 cu. ft. This figure includes interest on investment, depreciation, material and labor.

The generator is very readily put into action, and the heating requires only a few hours.

The arrangement of the heating and contact compartments of this generator exclude all possibility of the hydrogen gas being lost or escaping.

The generator gives off very little heat to its surroundings, the fire brick forming an excellent isolator of heat. The workmen are therefore not troubled by heat or gas. One man can easily attend two hydrogen generators—his whole duty is to change levers for each working period and read the pyrometer. All lever positions are automatically locked, thus preventing a wrong position of ventilators.

To replace the contact mass after long use, openings for filling are arranged on the top of the generator, and to remove it, Morton doors are placed on the lower part of the generator mantel.

The heat and reduction gases, as well as the steam, if not available, are produced by the use of a coke generator and steam boiler respectively. One coke generator and one steam boiler are sufficient for several hydrogen generators. The additional requirements for a complete hydrogen gas plant are a few unskilled laborers who can acquire the necessary training in a short time.

The hydrogen produced by this method is nearly chemically pure (99.2 per cent); only traces of nitrogen are present. The purification of the hydrogen gas leaving the generator is done in a simple scrubber in which the dust particles are removed by water. To remove traces of sulphur combinations and carbon dioxide, the gas is passed through a purifier containing iron ore and lime.

(*To be continued*)

Los Angeles Chamber of Commerce Urges War Department to Acquire North Island for Army Aviation Purposes

Recently the Chamber of Commerce of Los Angeles, appreciating the fact that North Island, at San Diego, is the best aviation field on the coast, very public spiritedly passed the following resolution urging its acquisition by the United States army:

WHEREAS, It is the sentiment of all Pacific coast cities that the United States Government should establish an aviation training base on the west coast; and

Whereas, The location of such a branch of the Government service must, of necessity, be selected with due regard to climatic, defensive and marine conditions; and

Whereas, Unanimous endorsement seems imperative to spur the Government to adequate consideration of this vital branch of National defense; and

Whereas, Special engineers of the War Department have reported that North Island, near San Diego, is the most perfect site for an aviation school on either coast of the United States;

Therefore be it resolved, That the Los Angeles Chamber of Commerce urge that the proposed site on North Island, which combines the geographical, topographical, meteorological and strategical advantages possessed by no other site on the entire seaboard or inland in the United States, be utilized by the Government for an aviation training base; and be it further

Resolved, That other commercial, civil and military organizations of the Pacific coast be requested to take action toward centering the advocacy of locating the aviation school at this point.

I hereby certify that the above is a true and correct copy of resolution adopted by the Board of Directors of the Los Angeles Chamber of Commerce at the regular meeting held Wednesday, June 7, 1916.

Attest: J. W. MITCHELL,
President.
FRANK WIGGINS,
Secretary.

Personal Paragraphs

Frederick A. Hoover made exhibition flights at St. Joseph, Mo., as a part of the fall celebration last week.

Sen Yet Young, of Honolulu, has been successful in passing his pilot's license test at the Curtiss School at Buffalo.

Several members of the Second Aero Corps of the National Guard, which is made up of Buffalo men, are flying at the Curtiss field at Buffalo. Lieutenant Morgan B. Moore, Sergeants W. G. Hickman, R. F. Fox and R. H. Tifft are making "solo" practice flights while the following are taking instruction from the Curtiss flyers: Lieutenant R. W. Bryant, Sergeant T. C. Knight, Sergeant W. W. Waring, Corporal Lewis and Private H. A. Simons.

Miss Jeanette Doty, of Biggs, a Chico, Cal., Normal School graduate, has entered the Silas Christofferson School of Aviation at Redwood City.

Miss Doty has entered aviation that she may work with Lyman Doty, her brother, who recently was graduated from the school with honors. The two have been inseparable as children, and Miss Doty has longed to work with her brother ever since he began to make his mark at the work.

SPECIFICATIONS FOR MILITARY HYDROAEROPLANES ISSUED

LIEUT. COL. GEORGE O. SQUIER, in charge of the Aviation Section of the U. S. Army, has issued specifications describing the design, construction, equipment and requirements of a military hydroaeroplane adapted to coast defense reconnaissance, and has asked for bids on six, twelve, eighteen, twenty-four, forty-eight and ninety-six machines. The specifications state that the machines shall be two-place biplanes or triplanes, with power plant consisting of two motors and two propellers, and the machines will be required to carry a useful load comprising the following:

(a) Pilot and one other 330 pounds.

(b) Supply of gasoline, oil and water necessary for a flight of five hours' duration, with motors turning continuously the number of revolutions per minute required for their rated horsepower.

(c) Instruments and equipment, 150 pounds. (Note: For calculations for longitudinal balance and statical stability, it will be assumed that the moments of these masses forward and aft of the center of gravity are equal.)

The specifications continue:

Unless otherwise specified, the useful load carried on all performance and maneuvering tests shall be equivalent to the above.

The rated horsepower of the complete power plant, consisting of two motors, shall be between 170 and 300. Looking from the rear, the right-hand propeller shall turn counter-clockwise, and the left-hand propeller shall turn clockwise.

The horizontal low speed shall not exceed 45 miles per hour.

The aeroplane shall be capable of a sustained flight of 6½ hours, carrying pilot and one other.

The aeroplane shall be capable of arising from the water in flight while running before a wind of 5 to 7 miles per hour, with load as stated above, in a period of time not greater than one minute and thirty seconds from the time full power is applied, with machine practically at rest.

It shall be capable of getting off in smooth water and calm air in a run of 1,000 feet.

Airworthiness.—The airworthiness and general flying qualities of the aeroplane shall be satisfactory to the inspector.

A pilot employed by the manufacturer may be required, at the discretion of the inspector, to perform the following maneuvers:

(a) Dive with longitudinal axis of the aeroplane at an angle of at least 50° to the horizon and hold this approximate angle for between one and two seconds, then pull out reasonably quick.

(b) Make steep banks to right and to left.

Among desired flying qualities are included celerity of response to control; the proper degree of symmetric and assymmetric stability (static and dynamic); steadiness in disturbed air, under various flying conditions.

In order to determine these attributes, an Army pilot may, at the discretion of the inspectors, fly any or all machines, executing sharp "figures of eight," dive, stalls of various kinds, side slips, sudden stopping of motor while climbing steeply, releasing of controls for a period of time after the machine has been steadied in horizontal flight, and such other maneuvers as he may deem necessary to determine the general suitability of the machine.

Maneuvering on the Water.—Maneuvering ability on the water shall be satisfactory to the inspector.

The aeroplane shall be susceptible of being driven on the water in a straight line in any direction with respect to a wind of velocity up to 15 miles per hour.

The aeroplane shall handle satisfactorily in a choppy sea, in waves 3 or 4 feet high, from crest to trough.

It shall show no marked tendency to "porpoise" either while landing or getting away in a calm sea or in a wind of not less than 12 miles an hour, the wind being either ahead, abeam, or astern.

It shall be capable of being turned on the water in "figures of eight" within a rectangle 1,400 by 600 feet.

The aeroplane shall be capable of turning to the left or to the right, starting the turn while running at full power either before or into a wind of at least 12 miles per hour.

It shall be capable of being landed before a wind of at least 15 miles per hour without danger of nosing under.

It shall be capable of getting off the water without injury to the floats in a 25-mile an hour wind with waves 3 or 4 feet high, from crest to trough.

It shall be capable of being landed in a cross wind of at least 10 miles per hour without injury.

Seaworthiness.—The machine shall not show undue tendency to capsize on a skidding landing or when running at high speed on surface with moderate wind and sea abeam.

The aeroplane when adrift with dead engines shall normally head into the wind.

It shall permit of being anchored for not less than one-half hour in open water in wind of velocity not less than 25 miles an hour without material damage. A sea anchor shall be used for this purpose.

The general arrangements, including design of floats, shall be such that the tail planes are held clear of the water when the aeroplane drifts astern in a wind velocity of not less than 25 miles an hour.

The arrangement shall be such that when taxi-ing in a moderate sea the propellers are not unduly subjected to the action of the spray.

The aeroplane shall be supplied with suitable bow chocks and cleats or other suitable means for towing or mooring.

Controls.—Controls shall be of the standard Deperdussin type, installed in the rear cockpit only.

The action of the control shall be positive, reliable, and such as to give the proper power ratio.

The lateral control flaps shall be double acting.

Stabilizer.—Aeroplanes designed for and provided with automatic controlling devices of approved type will be favorably considered. The use of a lateral stabilizer is especially encouraged. Positive, quick, convenient, and reliable means shall be provided to permit the pilot to cut out any automatic stabilizer. (Note.—The additional cost of the stabilizer installation shall be stated in the proposal).

Protection.—All material, parts, instruments, and accessories of aeroplane and power plant which will suffer either in material or in functioning from dampness and exposure to salt water must be satisfactorily protected therefrom.

Any provision possible should be made that will render any vital portion of the aeroplane or power plant structure relatively invulnerable to the fire of small arms or shrapnel, without material sacrifice in the design, strength or weight.

Power Plant.—All motors furnished under this contract shall show proper functioning at all heights from sea level to 7,000 feet.

The vibration initiated by the power plant at any normal speed of revolution shall not be excessive. This will especially apply at the normal speed of motor operation.

Field of Vision.—The field of vision of pilot and observer shall be satisfactory. This will be indicated on the prints submitted with the bid.

Section No. 2—Design of Hydroaeroplane

The general arrangement of this aeroplane shall be as follows: The pilot and observer shall be in a central body. The arrangement of this body shall be such as to permit the man forward to conveniently operate a machine gun to the front through an arc in a horizontal plane of at least 150° and through a vertical arc of at least 270° with the gun at an angle of about 75° to the X axis of the aeroplane, muzzle forward of the plane of rotation of the propellers. The arrangement shall permit the rear man to conveniently operate a machine gun through an arc in a horizontal plane of at least 150° to the rear and through a vertical arc of at least 180° with the gun at an angle of about 105° to the X axis of the aeroplane, and muzzle in rear of the plane of rotation of the propellers.

Gasoline Tanks.—The tanks for the main supply of gasoline shall be in this central body and so located with respect to the center of gravity of the aeroplane that the longitudinal aerodynamical balance of the aeroplane will not be appreciably disturbed as the gasoline supply is diminished or increased throughout the full capacity range.

Main Planes.—Upper plane shall extend in spread beyond the lower plane at each tip by an amount between 0.75 and 1.5 of the chord of the upper plane.

Lateral control shall be by means of trailing edge flaps on the upper plane only. The area of these flaps should be liberal in order to give sufficient power in control (without excessive change in angle) to handle the great lateral moment of inertia of the twin-motor system.

The retreat of the trailing edges of upper and lower plane shall not exceed 3°.

The general design shall be such that a negative rolling moment due to side slip at all normal angles of incidence and at all possible angles of yaw is clearly indicated. The transverse dihedral of the upper wing shall be between 175° and 179°. The transverse dihedral of the lower wing shall be between 173° and 178°. Any negative rolling moment due to side slip not obtainable from such dihedral will be obtained by the use of high vertical fins.

Control Surfaces.—Shall be of such proportions as to give positive control when flying at low speed.

Vertical rudders shall have liberal total area and moment arm to permit satisfactory handling in the air with one motor dead and the other turning full power. It is considered desirable to have at least two rudders, both of which lie in the slip stream of the propellers. It also is considered desirable to have provision for locking (during flight) a rudder in such a position, either way, as to carry the moment of thrust of one propeller turning full speed while the other propeller is still, thus permitting flight in a straight line without effort on the pilot's part.

A fixed horizontal tail shall have such an angle to the main planes, such a moment arm, and be of such area, as to give the proper degree of statical and dynamical longitudinal stability through the entire range of incidence. This angle to the mean chord of the main planes shall be between 2½° and 4½°.

The distribution of weight with respect to the resultant of forces due to air pressure shall be such that the aeroplane is in longitudinal balance in normal flight with no load on the elevators. This in horizontal flight, with load as stated, at an altitude of 3,000 feet above sea level, with motors developing about 90 per cent of rated power. In other words, it is desired that no moment be necessary from load on the elevator to bring the system in longitudinal balance, under conditions stated, with angle of incidence about halfway between that for best climb and that for horizontal high speed. The vertical moment arm of propeller thrust shall be such that this balance is not unduly affected with change in power.

Authenticated data from wind-tunnel tests are desirable, said tests to be made on a model of the type of machine made exact to a suitable scale, as follows:

Pitching moments (force vectors being plotted) at angles of incidence (mean chord of main planes) from — 90 to + 24°. Observations taken every 3° and, in addition, at the following angles: — 2°, — 1°, + 1°, + 2°. Additional data from wind-tunnel tests on an exact model of the type, especially indicating the derivatives in assymmetric stability (statical) will be considered of great value.

Suitable means shall be provided for hoisting the aeroplane from the water by crane or derrick. Attachment shall be made near the center of the upper wing, over the center of gravity of the aeroplane. The arrangement shall permit *either passenger or pilot hooking on quickly and conveniently* in a heavy seaway. The structure of the aeroplane shall be of sufficient strength to withstand the stresses imposed.

The specifications then go on to discuss in detail the matter of factors of safety, etc.

Concerning materials the specifications are very specific and wherever possible S. A. E. standard material is demanded.

Amongst the accessories specified are one aneroid barometer, one clock, two compasses, a gasoline-supply gauge, air speed indicator, angle of incidence indicator, inclinometer, one instrument for indicating proper bank, map board, map desk, speaking tube, flashlight, Pyrene fire extinguishers (two), water breaker tool kit.

The tool kit required shall comprise 4 spark plugs, 1 one-pound roll of friction tape, 1 roll of 20 ga. hard-copper wire, 1 spark plug socket wrench, 1 one-pound hatchet with hammer end, 1 double open-end wrench ¼ and 5/16 A. L. A. M., 1 double open-end wrench ⅜ and 7/16 A. L. A. M., 1 mill file, 10-inch, 1 Crescent or Sterling 6-inch wrench, 1 Crescent or Sterling 10-inch wrench, 1 pair 6-inch combination pliers, 1 pair 8-inch Klein wire cutters, 1 screw driver, 7-inch; 1 cold chisel, ½ inch; 1 special tool for tightening turnbuckles, 1 spool linen fabric thread, with needles, 1 special magneto wrench, 1 magneto point file, 1 box containig miscellaneous assortment nuts, bolts, cotters, clevis pins, etc., as used in aeroplane structure.

The weight of the tool kit shall not exceed eleven pounds.

Section No. 6, discussing the Power Plant is as follows:

The design of the power plant shall be such as will be suitable for installation in a military hydroaeroplane using twin engines.

Each engine shall be capable of developing between 85 and 150 horsepower, continuous operation.

Experimental or unproven motors will not be acceptable under this specification.

The type may be 6-cylinder vertical, 12-cylinder V, or 8-cylinder V.

All engines shall be water-cooled.

The desired speed of revolution of propeller, for rated horsepower, is between eleven and thirteen hundred revolutions per minute.

The carburetion and lubrication system shall be such as to permit running the motor at a speed of revolution 20 per cent of that for the rated horsepower. The motor should run smoothly and reliably for at least 15 minutes while thus throttled and pick up quickly and reliably to full power.

All moving and reciprocating parts shall be balanced in every way consistent with the design of the engine, and where possible, statically and dynamically.

Interchangeability of parts is essential.

The consumption of gasoline shall not exceed 0.65 pounds per horsepower per hour.

The consumption of oil shall not exceed 0.09 pound per horsepower per hour.

Engines shall not vibrate excessively in flight at any speed of revolution and particularly at that speed which develops the rated horsepower and at which the motor will be normally operated.

Provision to materially silence the exhaust of the engine is desired. Such provision, however, is not considered of sufficient importance to warrant serious addition of weight or loss of power.

All gears shall be incased and made oil-tight.

The crank case shall be oil-tight.

The engines throughout shall be oil-tight to such an extent as not to throw oil over the aeroplane or its occupants.

Propeller Shaft.—The propeller shaft shall conform to drawings and master gauges which will be furnished by this office.

Standard parts shall be used wherever practicable. In general, the S. A. E. standard will be accepted. S. A. E. standards for screw threads shall be used wherever possible. U. S standard threads will be acceptable for threads in cast iron, cast aluminum, or copper alloys Illustrations of the latter standard are pipe fittings and connections. S. A. E. screw standards, including bolts, nuts, cotter pins, lock washers, seamless steel tubing, carbureter flanges, ball bearings, roller bearings, and other items shown on the index sheet of the S. A. E. data book, Volume I.

An exception to the use of S. A. E. standards will be found in the spark plug, below the collar, which shall be the standard "18 millimeter metric" thread. The length of the plug below the collar shall be such that the plug shall not be flame-swept nor recessed more than ⅛ inch, with wall of cylinder.

The best possible means to make the timing of the engine convenient shall be provided.

Magnetos and carburetors shall be readily accessible for repair, removable, or inspection.

All bolts, nuts, and screws shall have a positive and durable locking device.

The gasoline supply system shall be as follows: Main supply tank in central body, capacity four hours and thirty-five minutes at full rated power; from main supply to gravity service tank located at the center of the upper wing, the capacity of which shall be 25 minutes' fuel at full rated power; from gravity service tank by gravity, along the lower wing panels, to the small headers at the carburetors of the two engines, the capacity of each header shall be one minute's fuel supply at full rated power; and from the small headers in each case to the carburetor.

Sections 8, 9, 10, 11 and 12 deal with the accessories to the power plant, propellers, inspection, motor and aeroplane tests, in detail.

Pressure on our space prevents our presenting these in full, but those desirous of securing copies of Aeronautical Specification No. 1002 can do so by making application to Lieut. Colonel George O. Squier, in charge of the Aviation Section, U. S. A., Washington, D. C.

"BLIMPS"

By Captain Thomas S. Baldwin (who built the first and only dirigible of the U. S. Army)

A new type of dirigible is being developed in Europe which will probably be built in this country in the near future. This consists of what is practically an aeroplane fuselage with its motor and propeller supported by a gas bag about 130 to 150 feet long and about 30 feet in diameter at the widest point, containing places for four passengers, fuel for six hours and making a speed of sixty miles an hour, with ability to climb to an altitude of 3,000 feet. These small dirigibles can be built for about $12,000. Head resistance is reduced to a minimum, everything being in streamline form. The fuselage, practically the same as that used for a tractor aeroplane, is supported by steel wire suspension from the envelope and provided with skids for landing. This type of dirigible can be made weather-proof so that it can be anchored to a pylon or housed in a tent. They have a novel arrangement for inflating the balloonets which compensate for any expansion or contraction of the gas. Instead of using an ordinary air blower run by the engine, they take the air pressure from immediately back of the propeller, through a pipe into the balloonet. These "Blimps" are used in England for military work, and are part of the new aerial program for 1917, which, it is said, promises the building of fifty airships of both rigid and non-rigid types.

The radius of action of these "Blimps" is naturally a limited one as compared with the larger rigid dirigibles, but a very important feature of their usefulness is the fact that they can be used for patroling at night. Night flying in an aeroplane is fraught with difficulties, particularly on account of the difficulty in landing in the dark and the necessity to keep going. A small dirigible, on the other hand, can rise from the ground and cruise around and remain in the air under most ideal conditions, as the temperature is usually constant during the night and not subject to the fluctuations which take place during the day owing to the fact that the sun at one moment may shine and a little later be obscured by the clouds. This causes a variation in temperature which effects the volume of gas and disturbs the equilibrium of the airship. At night an airship can patrol at high altitudes over cities and fortifications and keep a sharp watch in all directions for approaching hostile aircraft. They can shut off their motor or throttle it down and remain practically stationary. They can be equipped with wireless apparatus for both sending and receiving and they can also be equipped with delicate microphones for detecting the presence of airships or aeroplanes at a distance when it may be too dark to see. Although their work has been less spectacular than the operations of the Zeppelins, the non-rigid and semi-rigid airships of Great Britain and France have proven very successful for naval welfare, harbor defense and coast patrol work. The mobile forces of every French naval port comprise, in addition to destroyers and submarines, small non-rigid airships used for detecting submarines.

FOREIGN NEWS

FRANCE

Sergeant Raoul Lufberry, one of the Americans in the French aviation corps, has had a wide and varied experience. Lufberry's parents died while he was very young and he was brought up by a family at Bourges. At the age of thirteen he ran away and wandered all over the world, turning his hand to all kinds of trades. At Saigon he met Marc Bourpe, an aviator, who trained him as his assistant. The strange part of Lufberry's story is, that when he tried to enlist in the French Aviation Corps, thinking that he was French, he found to his intense surprise that he was an American. After many appeals he was allowed to enlist as Bourpe's mechanician. Bourpe was killed soon after and Lufberry swore vengeance, and after much pleading was allowed to join the Corps as a pilot. Since July 30th, 1916, he has brought down five enemy machines. The first three were destroyed within ten days.

Another day of great mortality among aviators on the western front is reported in the official bulletins of the German, French, and British of October 23. Twenty machines were brought down, it is stated. Eleven allied aeroplanes, according to Berlin, were shot down, while Paris tells of two German machines being brought to earth and the British War Office reports seven more enemy aircraft lost. We put all the official reoprts together to give a better comparison of the activities of the three powers.

The German official report has this to say of operations in the air:

"In the neighborhood of the coast, in the Somme and in the Meuse regions there was great activity. Twenty-two enemy aviators were shot down by aerial attacks and anti-aircraft fire. Eleven are lying behind our lines. Captain Boelke conquered his thirty-seventh and thirty-eighth foes, and Lieutenant Frankl his fourteenth enemy.

"Enemy aviators dropped bombs on Metz and on villages in Lorraine. No military damage was caused."

From the French War Office comes this account of aerial exploits:

"Yesterday twenty-four of our machines dropped 4,200 kilograms of bombs on blast furnaces at Hagondange and Pussinges, north of Metz, and also on the railway stations at Thionville, Mezures-les-Metz, Lonkwy, and Metz-Sablons. They attained their objective.

"This morning German aeroplanes dropped several bombs on Lunéville. There were no victims and the material damage was insignificant.

"On the Somme front yesterday two German aeroplanes were brought down and three others were forced down in a damaged condition."

The night report of the British War Office says of the deeds of aviators:

"Yesterday our aeroplanes bombed two railway stations behind the enemy's lines, hitting a train in motion and doing much damage to buildings and rolling stock.

"Seven enemy machines were brought down and many others were forced to land in a damaged condition. Eight of our machines have not returned."

GERMANY

Capt. Boelke, Germany's most famous aviator, has been killed in action, according to a Berlin despatch to Reuter's by way of Amsterdam.

While in an air battle above the German lines on October 28, his Fokker crashed into another machine. The wreck, with Boelke's body, fell within the German lines.

Capt. Boelke entered the German Aviation Service at the outset of the war, after having done a little flying as an amateur. He won promotion to the rank of captain and a decoration from the Emperor by his daring and skill as an air fighter.

The German official records credit him with having put forty allied aeroplanes out of action in his two years of service.

Lieut. Immelmann, his only near rival among the German air fighters, was killed above the British lines last spring, after he had brought down nineteen foes.

This is the second time that Capt. Boelke has been reported killed, Raoul de Ribiere, the French aviator, having shot down a Fokker, which, it was believed, was recognized as Boelke's on June 15 last.

"I use no special formula," said Capt. Boelke, last September, to Herbert Bayard Swope of *The World*, in the only newspaper interview he ever gave, "but try to get my man before he gets me.

"We Germans don't want to fight, but so long as we are forced to, you may be sure we will, and fight so we shall never be beaten. But I hope to visit America after the war."

Capt. Boelke, at that time, was walking with a cane, the result of a shrapnel wound in the leg. He had been wounded many times, and had had five machines smashed under him, but each time had succeeded in getting to earth with only slight injuries.

Witnesses of the Zeppelin attack on England on September 23 report, according to the Overseas News Agency, that bombs hit the Grimsby barracks, killing more than 400 soldiers, and that about sixty men were killed on board a cruiser which was hit by a bomb. It is said that Regent street, London, was for the most part laid in ruins.

"Eye-witnesses state that more than 100 buildings were badly damaged, some of them being completely wrecked," says the news agency. "The damage is estimated at more than 2,000,000 pounds ($10,000,000). Regent street, London, which is the main artery of commerce, was for the most part laid in ruins. In a southern suburb of London an ammunition factory was blown up.

"In Liverpool a bridge and tracks were damaged so badly that it will be impossible to use them for a long time. Several benzol tanks near the Thames were damaged.

"The Grimsby barracks were hit and more than 400 soldiers were killed. A cruiser with four funnels, which was anchored in the Humber, was hit by a bomb and about sixty men were killed. Two other warships were damaged badly.

"At Hull some buildings were damaged so badly that only the walls remained. Great damage was inflicted on ammunition factories and railroad stations at Leeds. An alcohol factory and other buildings at Portsmouth were struck, twelve cars loaded with horses were destroyed, a dock was damaged and railroad cars were blown up.

"German papers compare these results with the affirmation of British papers that the air attacks caused no damage. They point out the fact that the British Government blocked the cables of the Hearst International News Service because it sent out 'incorrct reports to New York about the successes of German airships.'"

Edgar Rickard, an American, who arrived on the Ryndam, said: "I lived within a few blocks of Regent street until October 5. No building on Regent street was even struck. There was no damage whatever in the metropolitan district, except at Brixton."

GREAT BRITAIN

The correspondent of the New York *Tribune*, an eye witness to the stirring scenes on the Somme battle front, reports that a visitor to the battle front is at once struck with the supremacy of the British R. F. C. over the Germans. He reports that while he viewed the proceedings British aviators worked almost unmolested, their only opposition being the fire of the guns below. The German fliers, he says, very rarely come over the Allies' lines.

ITALY

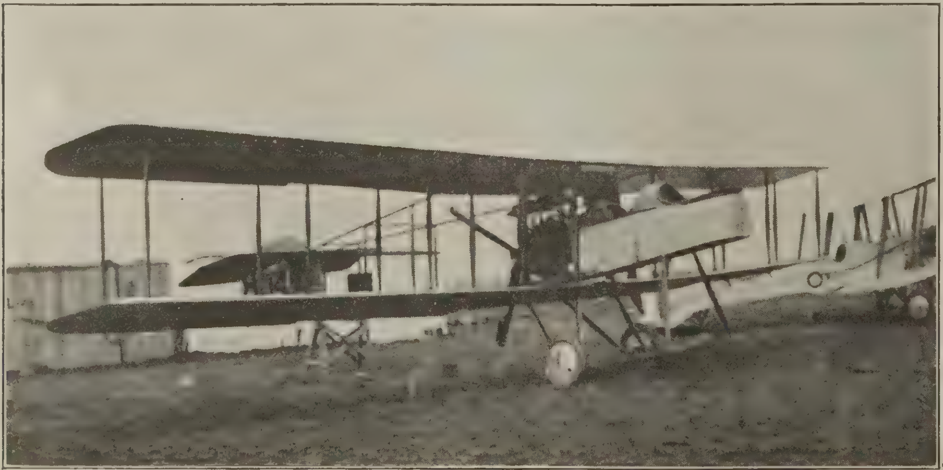
The following interesting report is contained in a despatch to the New York *Globe*:

The Austrians have been over Venice about thirty times since the beginning of the war. The observation station at Venice is equipped with delicate microphones, which detect the noise of the motors of the enemy as soon as the planes leave Triest, some sixty miles away. The invading planes cover this distance in forty minutes. The instant the microphones record the beginning of the attack, six big sirens are opened. These resemble the sirens used on automobiles, but make so much noise no one can sleep.

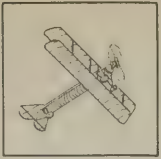
On the occasion I was present all the guests in the hotel flocked downstairs, some dressed, others consciously proud of being in their pajamas. The men were given a musty baggage room as a haven of refuge, the women another similar room. It was interesting to find among the occupants of the baggage room an Italian captain and a naval officer. Evidently they realized the danger of aerial attacks.

One can stand in the doorway of buildings, however, almost with impunity; the only danger is from bombs, and were a bomb to strike the building one could hardly escape by retiring to the baggage room. The bombs sometimes contain sixty kilograms of high explosive and weigh 250 pounds. But the real danger to pedestrians is from falling shell fragments and shrapnel from the Italian anti-aircraft guns. Small bits of steel, my friend said, drop like hail during the raid. The people take refuge under the arches of the ducal palace, which have been propped with brick so as to leave only a little space between. The machine guns patter and the flashes of the bursting shells remind one of an old-time Fourth of July. The noise is deafening, the picture beautiful. Now and then one hears the hum of an enemy motor soaring 2,000 yards above the street. The Austrians are scrupulously careful not to be seen.

Recent raids have mostly been on Mestre, the railroad junction on the mainlaid, and except for forty metres of track ripped up no damage has been done.

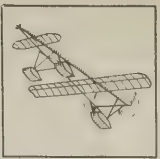


The Farman Pusher. (Note position of observer's seat, allowing machine gun to be fired at almost any angle.)



MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Models for the Beginner

To the initiated in any subject, all matters connected with it appear more or less simple. To the uninitiated, the reverse is, of course, the case. Everything has to be learned, no matter however simple. There was a time when even the most expert aeromodellist knew nothing about the flying or even the launching of the most simple model—presuming that the term *simple* can really be applied to anything aeronautical. We wonder how many people, both juvenile and grown-ups, have at some time either purchased or been made a present of a model aeroplane and have failed to obtain anything in the nature of a flight out of the same?

The following article is written for the benefit of those who are interested in aviation but who have not, so far, actually indulged in any flying, model or otherwise: Before the "flying" naturally comes the "buying" of the model—unless it is a present, in which case you may have no choice. To anyone about to buy a model, I would say, don't—unless you are a member of the model club, or, have among your friends a more or less expert aeromodellist—buy a set of parts, simple as it may seem to assemble them. Unless you are something of a model engineer, your chances are more or less against success. When buying a model, never buy a cheap one, or for that matter a foreign-made one, which is, generally, the kind made to show, and not utility, nor to stand any rough usage. The machine should also be one with a single propeller, and of what is known as the loaded elevator or Canard type, *i.e.*, elevator in front, and *not* with a main plane in front of the tail (elevator). On no account purchase a tractor, *i.e.*, one which flies propeller first.

If the model be a present, then the first thing to do is to find out which way it flies—propeller in front or behind—ascertaining at the same time the correct way to wind up the propeller. A case has been recently brought to my knowledge, and it is by no means an isolated one, of the possessor of a simple model spending his Christmas holidays in trying to make it fly propeller first. The type of full-sized machine with which the general public is best acquainted is, of course, the tractor-propeller first type, and they naturally think that models fly the same way.

Now when we look at any propeller we see that it has a convex and a concave side, *i.e.*, the blade is (almost invariably) hollow-faced on one side; *now it is this side that should point towards the rear in flight.* A model advances forward owing to the stream of air which it drives or tends to drive backwards, and just as the hollow or curved side of an aeroplane's wing is turned downwards, so in the case of a propeller is this side turned towards the rear.

Having now got our model the right way about, we have next to determine which way to wind up our rubber motor; obviously *we have so to wind it up that when it unwinds it shall cause the propeller to drive the column of air backwards.* As to which way we turn it, clockwise or anti-clockwise, that all depends on the *pitch* of the propeller, like the thread of a screw which may be right-handed or left-handed. If the model has two (twin) propellers, then, having determined (by the method already stated) the correct way for *one* propeller, the other will be wound up in the opposite direction, because it will be of the opposite pitch.

All this you will, of course, have found out at home, before actually setting out to fly your model. Choose a calm day for your first attempt, or, if it be perforce a more or less windy one, select a sheltered spot and test the *gliding* capabilities of your model; in other words, before actually flying your model, you first make a number of experiments on *launching* the same, first for practice, and in the second place to find out if your elevator or small plane is correctly adjusted for actual free flight. Generally speaking, the model should be launched against the wind; there are, of course, some exceptions, but this should invariably be the case for all beginners. Theoretically the model should be launced into the air with the velocity or speed with which it flies. If launched with a velocity in excess of this it becomes at once unstable and has to "settle down" before assuming its normal line of flight. If the launching speed be insufficient, it may be unable to pick up its requisite velocity in time to prevent it falling to the ground. If your model be a monoplane of no great surface, like a Clarke's flyer, it must be launched hard; if a biplane well surfaced like the Bragg-Smith and pointed into the wind, such may be, practically speaking, held up and just released, the model being held by the motor rod in the left hand, whilst the right holds the propeller at or near the boss; release the propeller, and then remove the left hand sharply, giving the model a slight pull forward at the instant prior to doing this.

To return, however, to launching for gliding test, with the motor unwound, in this case the model, no matter how well surfaced, must be *projected* into the air, with its nose *slightly* downwards. Most aeromodellists use two hands for the purpose, some grasp the motor rod or *fuselage* at the centre of gravity, or as near as practicable. In such a case, the machine is held high above the head with the arms outstretched. The model is then thrown forwards, and slightly downwards, the whole body swinging to the movement like an inverted pendulum.

At the moment when it is felt the model is lifting, the fingers grasping the model must be opened out, and the arm drawn swiftly forwards and downwards, or the rear part of the model will catch the hand or wrist.

If it is found that the model persists in diving forwards and digging its nose into the ground, then the angle that the elevator plane makes with the horizontal must be increased slightly, not too much, until it is found that the model makes a good even glide. If the model soars up into the air, nose upwards, and then dives, the angle must be reduced.

If the model be a tractor or tail-type, the adjustment is more difficult, because such models are far more sensitive to small differences than the Canard type. If the model soars up into the air and then dives, obviously there is too much lift forward, and if it refuses to rise the reverse is often the case. Such models are frequently adjusted by moving the main plane along the *fuselage*. The beginner should leave such models alone, for he is not so likely, until he has had some considerable experience, to obtain good results with them.

Beginners would do well to confine their attention to models with single propellers and of the biplane type, such as the (simple tye), which is, from its general configuration, of considerable strength, and will stand a lot of rough usage. It is possessed of exceptionally good stability, and is eminently suitable for a novice. Lubricate your rubber well, and do not overwind it. Be content with a flight of a hundred yards, and carefully note all that happens after making any particular adjustment. Remember, in the above-mentioned type of model you *can* steer by tilting the elevator; find out (by trial and error method) how to do this, *i.e.*, make the model circle either to the right or left, etc., and when you have become proficient in flying such a model, then you can think of passing on to models of a less simple type.

—Courtesy Flight.

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Important Notice

Our readers will remember that last week, in our article of Lord Stephen Stewbum, and England's revenge, we left our modest hero with his hands raised over his head in anger. Honest, we hated to leave him in that uncomfortable position for a whole week, but we could not help ourselves. The thing weighed upon our mind so much that we even tried to get out an extra edition and allow the Earl to take his hands down from over his head, but we found that impossible. So just imagine Lord Stewbum standing all week in front of a window looking down into the street with his hands held high over his head, and with never a wink of sleep or a bite of food to eat! We believe that once and for all the fortitude and bravery of the Earl have been established. We hate to burden you with this, but we feel that as a well wisher of the Earl, you must know that before he could straighten out his arms he had to undergo a slight operation. However, he underwent it with all the sternness which has made him famous.

But here is the point of this notice. We and the Earl talked over the subject of arranging a good, severe revenge for Great Britain, but we could not agree on the main points. For one thing, we held out for Hashimura Togo to Captain the fleet of avenging aeroplanes, but the Earl could not see it at all. And then again, the Earl wanted to be too cruel. We talked over the plot of the thing and he confided to us that if he was to be the hero in our story he insisted that at least one thousand Germans were to be killed. That, we could not allow. We like to have action in our stories, but gosh hang it, we have not killed a man yet and we do not intend to begin now! There the thing halted. We were for a good sound revenge, but with no deaths, but the Earl said he would be no mollycoddle hero. "One thousand deaths or no story with my name in it," he said. So we are afraid that for the present we shall have to let Great Britain go unavenged. We could not think of having any other than a noble do the deed, and as the Earl was the only one we could get, we guess we will have to let it go. It probably would not have been interesting, anyway.

We reproduce the following by the kind permission of *Flight:*

"Some interesting speculations as to the cost of the last Zeppelin raid were given by M. Louis Forest in the *Matin* last week. Basing his observations on the principle that Germany entered the war as a business proposition, M. Forest puts the following on the debit side of the sheet: (We give all costs in pounds. A pound is approximately five dollars.):

1,200	pounds for petrol.
600	" " oil.
1,000	" " bombs.
3,000	" " refits and repairs.
250	" " Wolff telegrams.
60,000	" " loss of one Zeppelin.
10,000	" " pensions.
10	" " iron crosses.
76,060	total pounds, or $380,300.

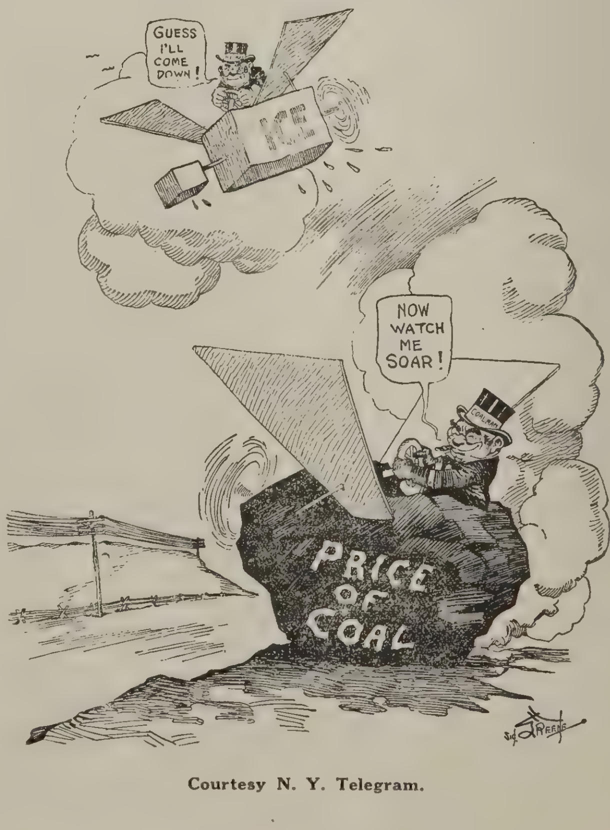
He credits to the other side of the ledger two British lives lost, and assuming that he is Hindenburg making out a report to the Kaiser, proceeds:

"Your majesty will readily perceive that this expedition gives us something substantial to go upon for the solution of the problem before us, and which alone can gloriously terminate the war, namely, the destruction of England. The loss of two Englishmen having cost us about half a million dollars, a simple calculation shows that, taking the population of Great Britain in round figures at 46,000,000 souls, that in order to kill off the lot we shall not be obliged to spend more than $9,700,000,000,000. I venture to think that there will be no difficulty in obtaining this sum from the Minister of Finances, especially when it is considered how reasonable it is compared with the results it will achieve.

"The money side of the problem settled, there remains one small point to be got over. The destruction of two Englishmen having cost us 20 Germans, a superficial mind might imagine that we ourselves will all be wiped out before we have encompassed the death of every inhabitant of Great Britain. Seeing, however, that the Permanent Committee of German Professors established to deal with the problems of war has always been able to demonstrate that whatever is necessary for the pursuance of German aims can be accomplished, I do not doubt for a moment but what the same committee will discover a formula proving that this point is only an apparent difficulty, and not of a nature that need for a moment trouble or thwart our activity.

"Hindenburg."

THE AVIATORS



Courtesy N. Y. Telegram.

Problems of Automatic Adjustment of Flight Altitudes

By A. J. Macy

(M. A. J. Macy, inventor of the Macy stabilizer, was to have read a paper at the last meeting of the Aeronautical Society, but was prevented from doing so through illness. The paper was prepared to stimulate a discussion of the subject, rather than to go into the technical details of automatic stability, and in order that those interested in aeronautics throughout the country may have the benefit of the suggestions contained in it, we present it herewith.—Editor.)

THE attitude of an aeroplane in its disposition toward gravity, the relative wind, centrifugal force and the other, less important factors that determine it.

This attitude must be constantly changed or adjusted to meet the changing conditions of flight. Such adjustment is effected by movements of the control surfaces.

It is clear, then, that a mechanism that will automatically adjust attitudes correctly, in flights, must be a mechanism that will recognize the changing conditions of flight and move the controls through all the degrees necessary to effect adjustments.

It must go further and take into consideration such changes at their inception and operate the controls in the nice, varying degrees that will accommodate the attitudes to all parts of the changes.

The first thing that tends to determine the attitude of a 'plane is the course desired. In other words, the general attitude of the 'plane will be governed chiefly by the course the pilot desires to take when he elects to go to some definite place in his aeroplane.

However, it will be understood that other factors have to do with the attitude if we recall that a straight course is the shortest, most natural course and then remember how aviators are often forced to circle about to land; how they must carefully avoid great drifting at the ground; how they must go with, against or quarter the breeze, etc., etc. In fact, the highest skill in flight is the skill by which the pilot effects the closest safe approximation to the course desired when the desired course is unsafe or impossible..

If he turns he must put his machine to that attitude that is called a "bank," and it must be just enough. If he banks too much, out of the combination of factors that insist the attitudes, gravity will claim an advantage and force the "side slip." If he banks too little centrifugal force will be able to take advantage of the rest of the combination of factors and effect the "skid."

If he shall place the 'plane at too great an angle of incidence the center of pressure will move to the advantage of head resistance, gravity, etc., and the harmony of the combination of factors will be lost and a "stall" takes place. On the other hand, if he shall adjust to that attitude that will make his angle of incidence too small, his speed will be accellerated until great constructional strains are put on the aeroplane, and a given movement of the control surface has a new, different effect on the 'plane, and he is liable to the confusion, generated at such a time, of high speed, a rapid approach to earth, a changing rapidly of atmospheric pressure, the terrific air blast, etc., etc.

And so we might go on pointing out the more or less well known facts that show the endless combinations of factors that effect flights and, owing to the changes in some of them, demand an almost constant adjustment of attitudes.

It were well to point out here the reason it is worth while to master so difficult a problem. When the attitudes of an aeroplane are correctly adjusted during flight the aeroplane is the safest, fastest, most wonderful vehicle of man! Surely reason enough.

Much has been done to give the pilot more time to adjust attitudes or to make such adjustment inherent in the 'plane. In this connection let us recall the reserve motor power that permits a greater angle of incidence and robe the "stratas of air" of most of their terrifying effects, and, together with improved wing curves and better design throughout, makes for the desirable range of speed, the "dihedral," the "rake," the "stagger," the "stabilizer surface," the "decalage," etc., etc.

However, for degrees of inherent stability we realize we sacrifice degrees of controlability, and it remains the truth that the best aeroplane, if its attitudes are always correctly adjusted, is the very controllable 'plane that requires, under manual control, the constant, nerve-racking skill of a superb pilot.

It has been found that a machine may be made to automatically adjust the attitudes of an aeroplane, and the reason for its use: it relieves the pilot of his tremendous task of attitude adjustment, functions more quickly and more accurately than he can at his best, never is confused and permits him to ride the most satisfactory kind of 'plane, as far as performance goes, because it has added the factor of safety to the other ideal qualities of this type 'plane.

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Thus it is given the flexibility and resiliency which enable it to absorb landing shocks without injury to aeroplane.

Goodyear Cord Tires are double tube clinchers, in various sizes up to 26x5 inches. The Goodyear Rim, light and strong, is made to fit these tires.

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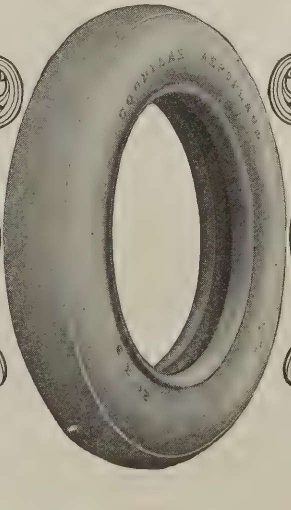

Pilot's Certificates Granted

The following certificates were granted at a meeting of the Board of Governors of the Aero Club of America, held on October 11, 1916:

Hydroaeroplane—Eugene C. B. Simonin, Philadelphia, School of Aviation, Essington, Pa. Curtiss Model E Hydro, No. 53 equipped with Curtiss OXX2 motor.

Julian C. Biddle, Philadelphia, School of Aviation, Essington, Pa. Curtiss Model E Hydro, Curtiss 100 h.p. motor No. 54.

Dudley S. Norton, Philadelphia School of Aviation, Essington, Pa. Hydroaeroplane, Curtiss 100 h.p. No. 55.

John W. Geary, Philadelphia School of Aviation, Essington, Pa. Curtiss Model E Hydro, Curtiss OXX2 100 h.p. motor. Motor No. 56.

Aviation—Frederic A. Robinson, Burns School, Los Angeles, Curtiss Biplane Pusher, Curtiss Motor No. 606.

George U. Kobashi, Burns School, Los Angeles, California Curtiss Biplane Pusher, Curtiss 75 h.p. motor No. 607.

Donald D. Harries, Curtiss School, Buffalo, N. Y. Curtiss Tractor JN4. Curtiss OX2, 90 h.p. motor No. 608.

John B. Robinson, Curtiss School, Buffalo, N. Y. Curtiss Tractor JN4. Curtiss Motor OX2, 90 h.p. No. 609.

Harry W. Wheatley, Curtiss School, Buffalo, N. Y. Curtiss Tractor JN4. OX2, 90 h.p. Motor No. 610.

Personal Paragraphs

William Brock, of Springfield, O., and Miss Corinne Smith, daughter of Mr. and Mrs. J. B. Smith, of Martinsville, were married Sunday at the home of the bride's parents. Brock is an aviator, and became acquainted with his bride while he was making flights at the Martinsville fair. They will live in Iowa.

Miss Helen Hodge, star girl pupil at the Silas Christofferson Aviation School, Redwood City, showed her knowledge of aircraft when the propeller of the plane in which she was flying snapped suddenly in midair, while she was preparing to make a landing 500 feet below. The girl handled her aeroplane perfectly and descended from the clouds without the slightest injury.

Mrs. William C. Compton, of Omaha, Nebraska, has announced the engagement of her daughter, Miss Elizabeth Compton, to Lieutenant William M. McIllvain, United States Marine Corps aviator, who is now stationed in California. Miss Compton is a well-known beauty and has attracted attention in society all over the country.

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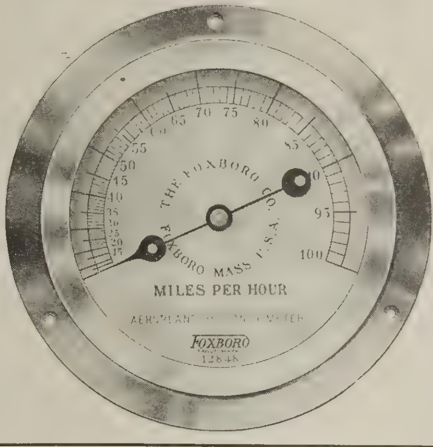
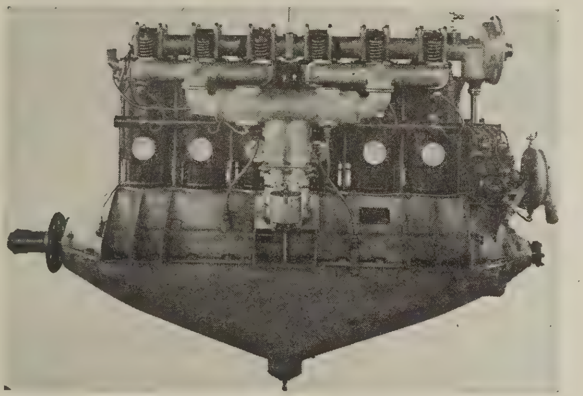


Hall-Scott Aviation Motors



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HALL-SCOTT MOTOR CAR CO., INC.

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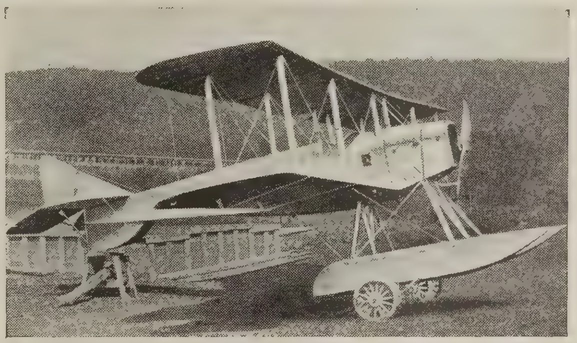

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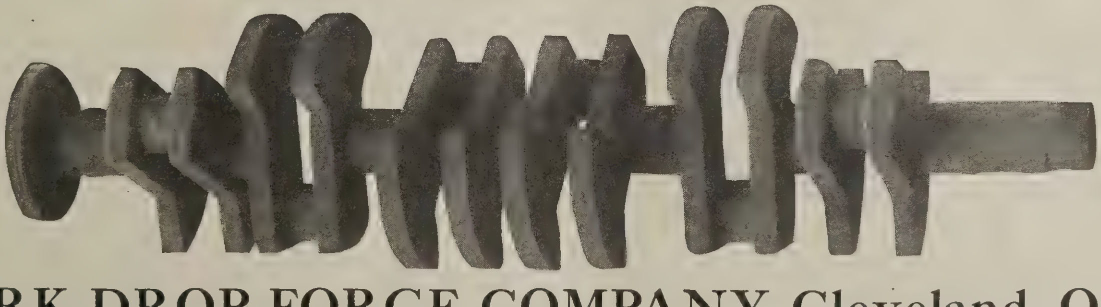

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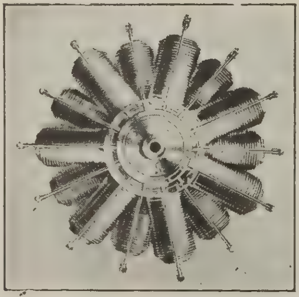

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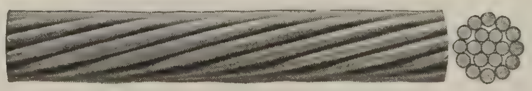

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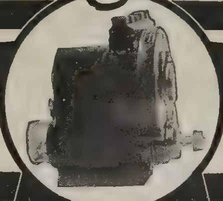

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ANNOUNCEMENT

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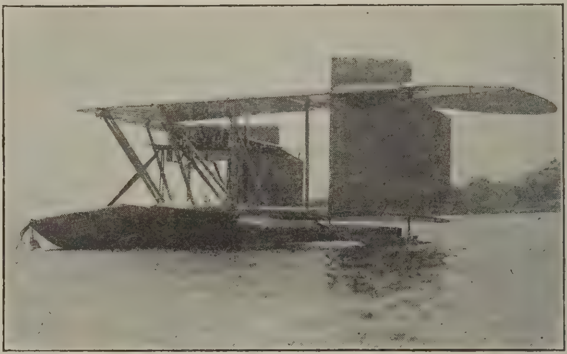

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Absolutely inherent balance is assured by the Dunne system, a balance as certain and simple as that afforded by the keel of a sailing yacht.

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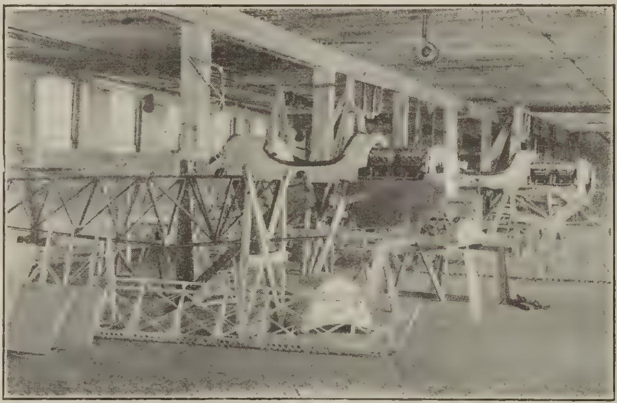
The engine may be started without leaving the cockpit.

The construction is worked out with a nicety of detail which must be seen to be appreciated.

THE BURGESS COMPANY, Marblehead, Mass.



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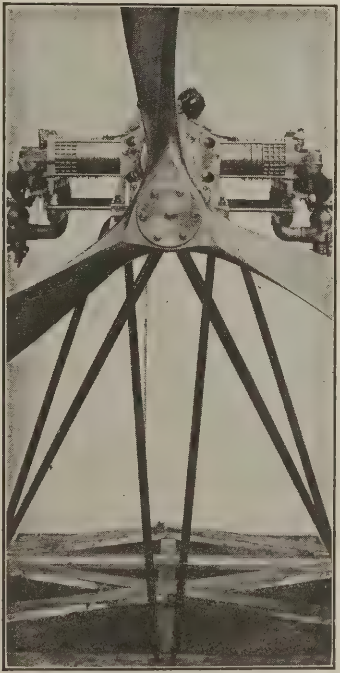

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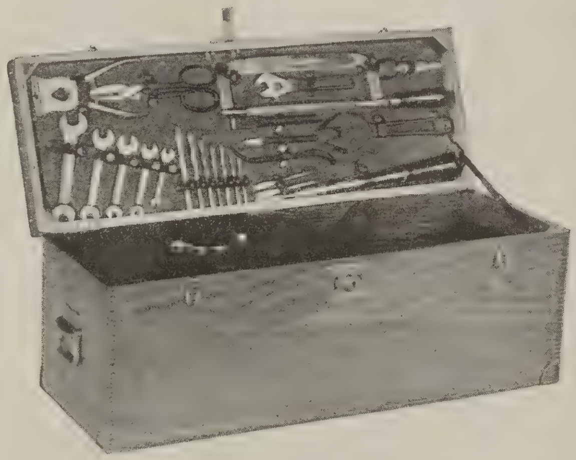

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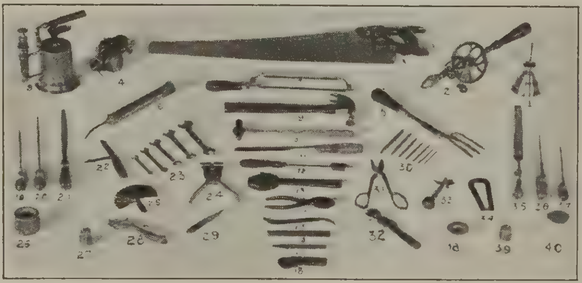

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All instruction is in the air. Dual controls. The student is taken into the air on the first lesson.

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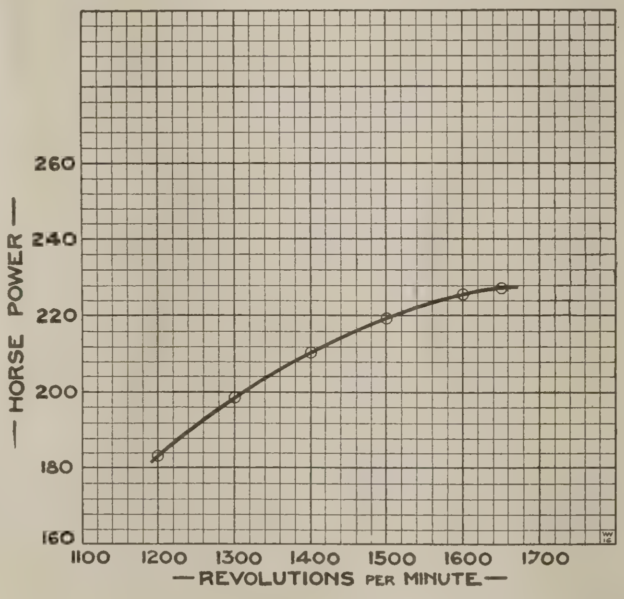
NOTICE

OWING to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed Horse Power	210.50
Minimum Observed Horse Power	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

CURTISS AEROPLANE & MOTOR CORPORATION

BUFFALO, N. Y.

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AERIAL AGE
WEEKLY

VOL. 4, No. 9 NOVEMBER 13, 1916 10 CENTS A COPY

UNIVERSITY [illegible]
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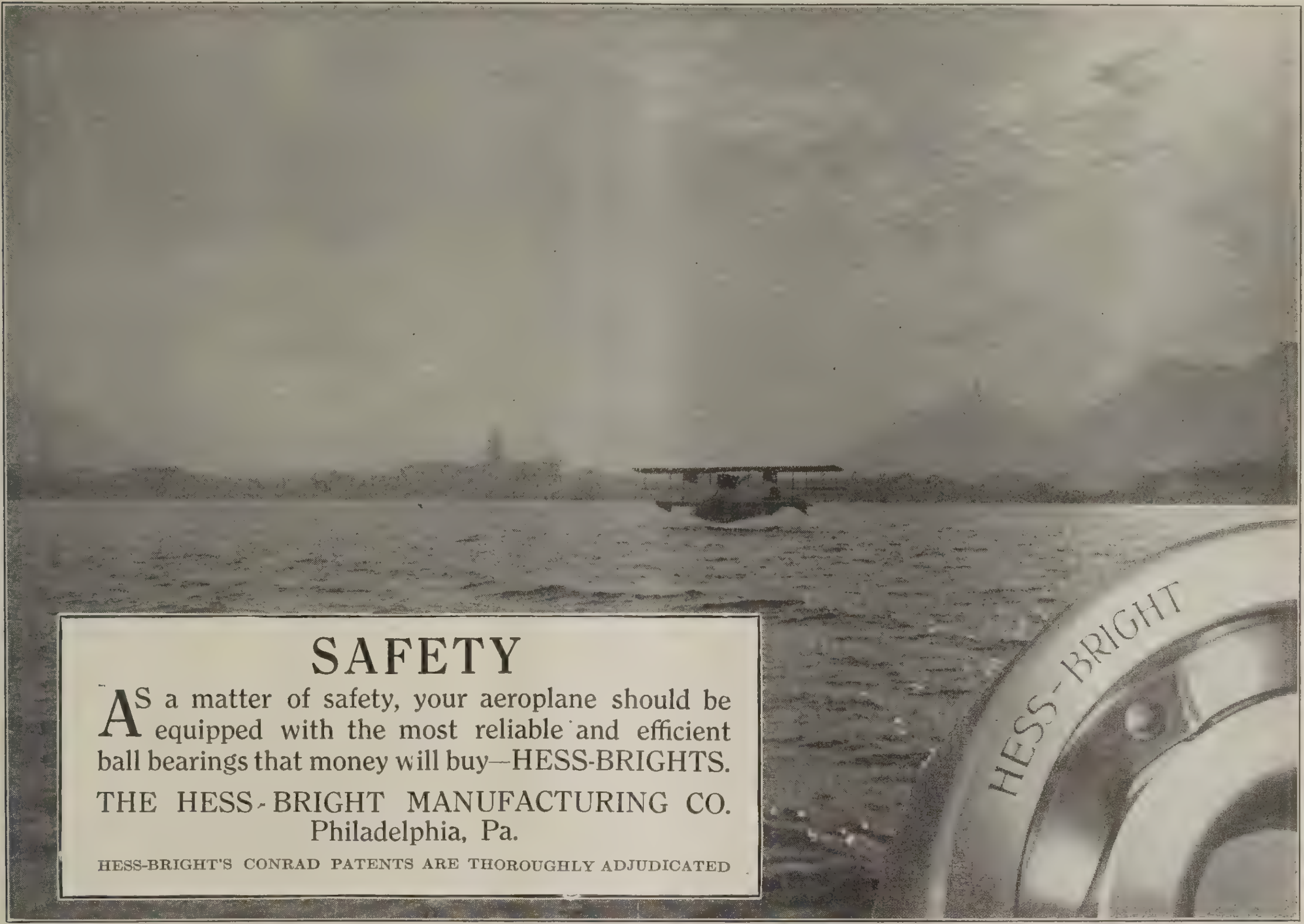
Supporters of Aerial Preparedness Favored in Elections

Carlstrom's Chicago-New York Flight

Burgess Seaplane Described

Equipment for Aero Units

WRIGHT-MARTIN
60 Broadway, New York
AIRCRAFT CORP.



SAFETY

AS a matter of safety, your aeroplane should be equipped with the most reliable and efficient ball bearings that money will buy—HESS-BRIGHTS.

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Philadelphia, Pa.

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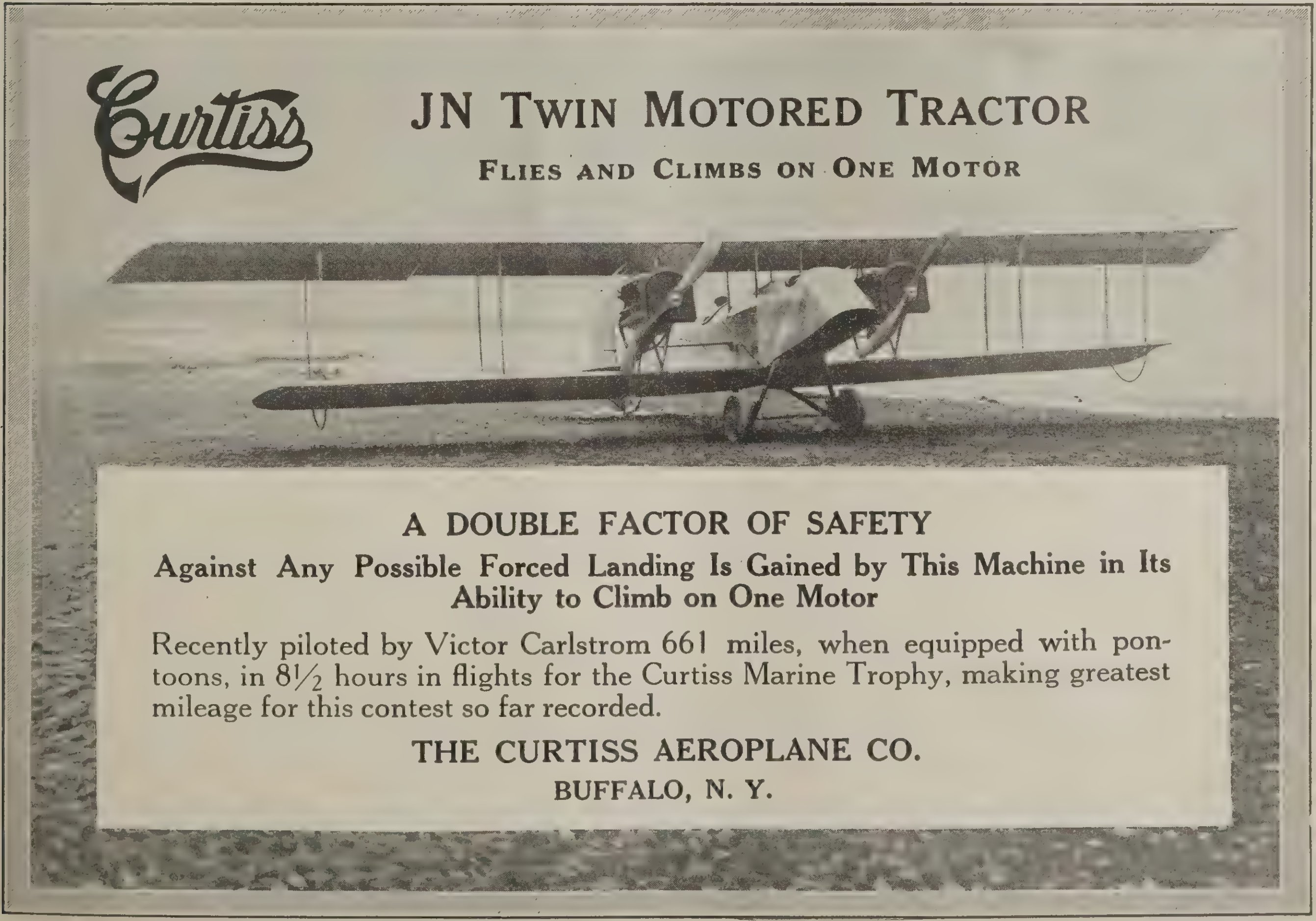

Curtiss

JN TWIN MOTORED TRACTOR

FLIES AND CLIMBS ON ONE MOTOR

A DOUBLE FACTOR OF SAFETY

Against Any Possible Forced Landing Is Gained by This Machine in Its Ability to Climb on One Motor

Recently piloted by Victor Carlstrom 661 miles, when equipped with pontoons, in 8½ hours in flights for the Curtiss Marine Trophy, making greatest mileage for this contest so far recorded.

THE CURTISS AEROPLANE CO.
BUFFALO, N. Y.

THE FIRST
PAN-AMERICAN AERONAUTIC
EXPOSITION

Grand Central Palace, New York,
February 8th to 15th, 1917
TO FOLLOW THE AUTOMOBILE AND MOTOR BOAT SHOWS

Held Under the Auspices of

The Aero Club of America
The Pan-American Aeronautic Federation
The American Society of Aeronautic Engineers

THE preliminary announcement of the plans of the First Pan-American Aeronautic Exposition has created such tremendous interest, and so many requests for space have been received, that the original plans are being extended and the show space is being doubled.

The Exposition will afford the opportunity to show the tremendous progress that has been made in American Aeronautics in the past two years.

The people of two continents will come to the Exposition to see what the American Aeronautic Industry has produced for National Defense, utilitarian purposes and sport.

The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos - Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

APPLICATIONS FOR SPACE SHOULD BE ADDRESSED TO
HOWARD E. COFFIN
CHAIRMAN, ORGANIZING COMMITTEE
Pan-American Aeronautic Exposition
297 Madison Avenue, New York

G. DOUGLAS WARDROP
Managing Editor
RALPH E. deCASTRO
Associate Editor
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AERIAL AGE
WEEKLY

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Contributing Technical Editors

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Vol. IV NEW YORK, NOVEMBER 13, 1916 No. 9

SUPPORTERS OF AERIAL PREPAREDNESS FAVORED IN ELECTIONS

THE returns show that those legislators of both parties who stood for aerial preparedness in the Senate and and House of Representatives during the past session have duly been reelected, and that among the newly elected Congressmen and Senators there are some very strong workers for aerial preparedness.

As we go to press, both parties claim victory for their candidates. The Hughes plurality of last night has been lessened by late Wilson returns.

Hughes has pronounced himself in favor of aerial preparedness, and pledged himself, if elected, to appoint at the head of the departments, in the Cabinet, the strongest men he can find. The names suggested are of men who are known to be for real preparedness and Americanism.

CARLSTROM'S flight from Chicago to New York was a great, epoch-making flight! This expression from us who are close to aeronautical matters, and know, therefore, what great achievements we can expect if the proper inducements are given, is not as important as the expressions from the editors of the lay press, particularly the metropolitan newspapers, whose opinion represent the opinions of the millions of people who are not so close to aeronautics. We therefore quote several editorials from the newspapers which express public opinion of the event.

"Carlstrom broke all American records of continuous flight in his swift journey through the air from Chicago to Erie, Penn., in 4 hours and 17½ minutes," said the N. Y. *Times* editorially. "His compulsory stop at Erie to repair an utterly trivial derangement of the machinery of his aeroplane, the leakage of gasoline because a nut holding a supply pipe had been loosened by a vibration, spoiled his chance to make the flight continuous. But there was no real impairment of the machinery in the whole journey, which he made in three stages, arriving at Governors Island in New York Harbor at 8:56 o'clock yesterday morning in a flight from Hammondsport, 315 miles away, which took him 2 hours and 21 minutes. There was enough in his achievement to indicate the enormous advance made in the art of aviation and the improvement of the instruments of the art, the flying machine and its engine. We have heard much of the achievements of the aviators in the European war, but they are far away, and Carlstrom's defeated attempt to fly from Chicago to New York without a stop brings more closely to us the established fact that travel through the air for long distances is practical and safe and will be among the everyday commonplaces of the futre.

"The skilled aviators have performed successfully all the thrilling feats that need to be performed with the heavier-than-air flying machines. They have shown that these dangerous-looking things can be perfectly controlled by the turn of a wrist. Carlstrom has given as clear a demonstration of the practicality of long-distance flying as he would have done if he had accomplished his 900 and odd miles without a stop. The next time he tries it, with so good an aeroplane as the mammoth one he used Thursday and yesterday, he will not have to stop, for all the nuts and caps will be so securely fastened that vibration will not shake them loose. It is to be borne in mind that this aviator was never for a moment in peril. He had perfect control of his aeroplane. Each time he started he gained his highest speed very quickly. His altitude varied from 8,000 to 4,000 feet, according to the wind. A nautical mile and a third above the earth's surface he was perfectly comfortable and master of himself and his great machine.

"If we had possessed a few Carlstroms and machines of this kind to give to General Pershing when he went into Mexico, Villa's men would not be threatening Mexican cities now, and the expedition would have returned to the United States long ago. Will our army be permitted to profit by Carlstrom's object lesson, or will its bureaucrats continue to keep their benighted grip on its airmen? If a man can fly from Chicago to New York, and go a few miles out of his way on the journey, in less than eight hours and a half, he can soon fly across the continent in twenty-four hours, with perhaps two stops to get fuel, and the ocean flight which once seemed such a strenuous performance to Mr. Kipling will be a mere pastime in the near future. Carlstrom attained a speed in his flight beyond the possibilities of any surface travel. His average of 107 miles an hour for 452 miles beats all American records except his own on this very trip, for he greatly exceeded that on the last stage of his flying journey eastward."

Carlstrom's Feat

(Editorial in New York *World.*)

While Victor Carlstrom, the aviator, was disappointed in his attempt to fly from Chicago to New York without stopping, the feat he performed was so remarkable as to assure him the honor of establishing a new American record. But for a leak in his gasoline tank due to a missing tap, which forced him to land at Erie, Pa., it is altogether probable that he would have succeeded. As it was, for over four and a quarter hours he maintained an average speed of 116 miles an hour before he was compelled to descend, and then after a brief stop he continued 150 miles further his eastward flight.

The long-distance test by Carlstrom, under the auspices of the *Times,* is a very practical demonstration of the progress of aviation. So much attention has been given to the circus stunts of aerial performers that it is easy to lose sight of the more important achievements in the way of greater speed, stability and duration of recent flights. It is practicable today for the trained aviator in comparative safety to outrace the fastest express train without taxing his engine and to cover distances few high-powered automobiles reach on the best track.

It will not be long before Carlstrom or some other aviator will make the non-stop flight from Chicago to New York.

Thousands of Aviators and Universal Training to Defend Western Hemisphere

THAT the Pacific Ocean is to become the world's central basin, succeeding the Atlantic, which became the central basis upon the advent of the steamship, succeeding the Mediterranean Sea, as a result of the present war, the development of aircraft, submarines and ships was one of the prophesies made by Mr. Henry Woodhouse, a governor of the Aero Club of America, during an address delivered at the National Arts Club, November 1.

"What U-boats have done, in crossing the Atlantic, aircraft will soon do—but they will cut down the time required to a fraction of the time required by the submarines. There is no doubt whatever that Zeppelins could easily cross the Atlantic, and we are today building aeroplanes in this country which could cross the Atlantic in one flight at a speed of one hundred miles an hour, therefore crossing the ocean in thirty hours.

"The Trans-Atlantic submarine has brought most fundamental changes in the status of things. It means that our isolation has gone, our dream of invulnerability has been shattered, and looking ahead into the not distant future we can see that aircraft will soon cross the oceans and the Pacific Ocean will become the world's central basis, succeeding the Atlantic, which became the central basis upon the advent of the steamship, succeeding the Mediterranean Sea.

"The body of water that seemed to be a barrier to the world's fleets is now the avenue through which submarine fleets can come unseen to attack without warning. And the air, we know, also affords an unobstructed road through which aircraft can come—aircraft which, by the way, are capable of co-operating most closely with submarines in warfare.

"Other nations count their submarines by the hundred and their aircraft by the thousands—while we, the country which gave the world both the submarine and the aeroplane, are barely taking baby steps to 'test' these modern instruments of warfare!

"Recently Balfour said in the House of Commons: 'It will avail nothing to England to have control of the sea unless it has also control of the air.' Lord Beresford says: 'The new aerial warfare is going to be of so tremendous a character that it may supersede the Army and Navy.'

"England has about 9,000 aviators and very extensive aerial defenses and yet is not able to protect the British Isle from aerial attack.

"Upon the young generation of the New World falls the task of safeguarding humanity. The census shows that we have in the United States alone about 20,000,000 of able bodied men of military age but our Army and Militia number less than 200,000 men. The rest are untrained and would be slaughtered in an attempt to meet the well-trained soldiers who would come to these shores. So we must train them and as soon as possible.

"We all like to believe that this world war which is raging and is decimating the flower of manhood of other continents is to be followed by a reconstruction. But deep in our hearts we cannot help harboring a fear that this war will be followed by further destruction.

"It seems certain that at the end of this world war, this great hemisphere of ours, our great plans for the union of the Americas, our great hopes to safeguard humanity's rights, and to end militarism, are to be severely tried. Whether the trial is to be a trial of words or of fire depends on us, on whether young America with its heart in the right place, but with the power of an adequate Army and Navy, trained citizen soldiers and mobilization of industries to support its voice, can prevent the war-hardened nations from upsetting the peace of the Western Hemisphere in their desire to get some of the tremendous wealth which the nations of the Western Hemisphere are enjoying and the nations of the other hemisphere need to rebuild their empires.

"We must think with both our hearts and our minds when contemplating the reconstruction that will follow the end of the war. We will need both."

Aviation in War.

(Editorial in Milwaukee Evening News.)

When the Montgolfiers in the latter part of the Eighteenth Century startled the world by the invention of balloons, Erasmus Darwin, grandfather of the famous naturalist, foretold the military possibilities of machines capable of ascending into the atmosphere. In the American Civil War captive balloons were employed for the purpose of studying the enemy's position. Modern improvements on the balloon of course have immensely augmented the utility of aviation as an aid in the art of war, but the demonstration of what it could do has come somewhat slowly.

A writer in the Paris Matin has published a review of the work of the aviation corps of the French army. Here is the conclusion at which he arrives:

"We have seen the period of trials, we have seen the era of progress, we come now to the period of full expansion. To-day aviation is no longer a collaborator; it is an arm without which the army could not operate. It was Colonels Regnier and Barres who shared the work; the one devoted his attention to material and to armament, the other to employment, missions and tactics. In August, 1915, it required sixty-two machines to throw one hundred and fifty bombs; to-day four suffice to throw one hundred and sixty—that is, fifty-one machines less for ten bombs more. At the present moment we have machines which are veritable aerial batteries. Whatever may be the losses we suffer, we have a cohort of aviators to take their place. Every day a fresh name becomes prominent, and what acts of heroism are performed in crisis of which little is heard! What valor is displayed! There are regulators of artillery operating at heights of one hundred and two hundred meters; there are aerial scouts for maintaining communication between different corps, one of whom flew so low the other day that he almost touched the ground; there are photographers who take views of the destruction wrought by our batteries. At each attack those in command know minute by minute what the first wave is accomplishing, and during that time the toreadors of the air set the enemy in flames, barring the way to any airmen who may try to reach our territory. Now it is no longer by bombs that one counts, but by tons. During the period between August 1st and 26th we dropped at night more than 3,500 bombs on stations, convoys, storehouses and factories, without counting the bombardments carried out by the French artillery."

The aeroplane has ceased to be an experiment; it has become a necessity. No mistake was made by Congress when it voted a more liberal appropriation for the aviation corps of the United States.

Aviation Language

(Editorial in New York *Times.*)

THE invention and development of the automobile have placed many new words in the dictionaries. The word "automobile" itself aroused much hostility in the early days of self-moving cars, because it was an improper compound, because it was obviously an adjective rather than a noun, and because it was not English; but it has survived all opposition and is in the English dictionaries. So will "aeroplane" survive, though it may never be properly pronounced as a word of four syllables, the dieresis having been omitted, first by the printers, who always aim at simplification, and later by common consent. But the Aero Club is giving its attention to needful revision of the nomenclature of aeronautics, and Mr. Henry Woodhouse directs attention to the report of the National Advisory Committee on Aeronautics, which contains 115 terms used in connection with air navigation. Mr. Woodhouse himself has accumulated a collection of 2,500 terms relating to this subject.

What is aimed at is simplification. It is desirable that the accepted terms relating to what we call aviation should be such as express their meaning to the common mind. It is well at the beginning not to leave the vocabulary entirely to usage. Mr. Woodhouse obviously prefers aeroplane to the often suggested airplane. We have aerodrome, aerostatics, hydroaeroplane. Air squadron might be as serviceable as aero squadron, but it is likely that in most of the already long established terms we shall stick to the "aer" even if we pronounce it as a single syllable. Air service, however, will always be acceptable, but Mr. Woodhouse objects to the employment in the Army of the term "Aviation Section" to cover both the lighter and the heavier than air machines. The Signal Corps, he thinks, must have an Aeronautic Service instead, with an aviation section and an aerostatic section.

Airman may be accounted a better word than aviator, but shall we say airwoman instead of aviatrix, or shall we get along without bothering about the sex of the aeronaut? Surely we shall never call a woman an airman, although we have noted that they have lady Chairmen at some suffragist meetings. This much merely to glance at the difficulties to be overcome in establishing a permanent glossary of terms relating to a rapidly developing science. It is to be hoped that "sky pilot" will not stick, but "volplaning" is a word that demands consideration and scrutiny.

THE NEWS OF THE WEEK

Hydroaeroplane Presented to State of Massachusetts

Men prominent in the life of the city, state and nation were present Wednesday after, november 8, when the Aero Club of New England presented to the Commonwealth of Massachusetts the State Militia's first hydro-aeroplane.

The presentation speech was made by Godfrey L. Cabot, president of the Aero Club. Gov. McCall accepted the machine on behalf of the State, and congratulatory addresses were delivered by Maj.-Gen. Leonard Wood, U. S. A., Senator Henry Cabot Lodge, former David I. Walsh and Augustus Post and G. Douglas Wardrop, the Aero Club of America.

The invited guests included the members of the Governor's Council, the Mayors and City Councillors of Boston and Cambridge, members of the Massachusetts Legislature, Metropolitan Park Commissioners, United States Army and Naval Instructors detailed to duty in New England, and other prominent National Guard, army and navy officers.

The tractor which thus comes to Massachusetts was built by the Burgess Co., and is of the single pontoon "U" type. It is equipped with a Curtiss OXX-2 100-horsepower motor. It has the Deperdussin control, and is of orthodox dimensions, refined to give it an exceptionally low speed as well as a good range into high speed.

The single pontoon is built along the general lines of the Burgess seaplane type. The aeroplane was designed by Burgess primarily for the training of naval officers.

C. F. Willard with Aeromarine

Chas F. Willard, formerly president, L. W. F. Engineering Co., Long Island City, N. Y., is now president and engineer, Aeromarine Engineering & Sales Co., New York.

S. A. E. Winter Meeting Arrangements

A special committee of over thirty members is already working assiduously for the success of the 1917 Winter Meeting of the S. A. E. to be held the week of the New York Show. This committee, working under the direction of the 1916 Meeting Committee, is composed of members located in New York. The committee is divided into several committees of organization, with different work to care for.

One has charge of the Annual Dinner at Hotel Biltmore, Thursday evening, January 11.

Another committee has charge of the Midnight Frolic at the New Amsterdam Theatre, following the dinner on Thursday evening.

Another has charge of the luncheon on Thursday, January 11, for those attending the business and professional sessions.

The entire program of papers for the professional session, Thursday, January 11, has not been definitely completed. It is almost certain that there will be one paper on the subject of balance as applied to motor cars in general. There will be a paper on crankshaft balance; another on aeroplane engines; perhaps one on tractor engines; and on one or two other subjects.

Speakers at the professional session will not read their papers but will be given 10 to 15 minutes to orally digest them. Upwards of 30 to 45 minutes will then remain for discussion.

American Corps in War to Lose Name

The famous American aviation corps of the French army probably will lose its distinctive title soon as a result of protests to the State Department that use of the name is not compatible with American neutrality. There will be no formal exchanges on the subject, but the State Department will suggest informally to the French Foreign Office that mention of the "American" corps in official communiqués places this country in an embarrassing position. There is no doubt here that this point of view will be appreciated in Paris.

The corps, made up of a large number of young American aviators, was recruited and organized as a separate unit by special permission of the French military authorities. Its members have distinguished themselves time and again, particularly in the fighting around Verdun.

The complaints to the State Department followed a recent reference to the Americans in an official communiqué from the French War Office. Precedent for action was set early in the war, when at the informal request of the Washington Government Great Britain had the name "American Legion" withdrawn from a Canadian contingent recruited from the United States.

Army Aviation School at Essington?

The War Department may establish an army aviation school for civilians at Essington, Pa., as the result of a visit of an officer of the Aviation Section of the Signal Corps. This officer, accompanying by George C. Thomas, Jr., one of the directors of the school, made a long flight over the Delaware river with Walter E. Johnson, chief instructor at the school. He expressed himself as pleased with the conditions at Essington. Negotiations are expected to start within a few days.

Wardrop at Columbia

On the evening of November 1 G. Douglas Wardrop, editor of Aerial Age, addressed the students and others at Columbia University, speaking under the auspices of the Institute of Arts and Sciences. The audience was tremendously interested in his discussion of modern aeronautical progress, and marveled at the development in this country.

Army Balloon Bids Made

Offers of rubber companies to construct four balloons—the first equipment of the balloon division of the Army Aviation Corps—were taken under consideration November 3 by the War Department.

Two of the balloons will be of the ordinary free flight type, and the other two kite or captive balloons for observation purposes.

The Department also is considering specifications for several smaller type of rigid and non-rigid dirigibles.

The Late Anthony Jannus

Anthony Jannus, one of the best known American aviators, lost his life while testing a large sized flying boat for the Russian army authorities in Russia on November 4. Mr. Jannus represented the Curtiss Aeroplane and Motor Corporation in Russia, and it was his duty to test and deliver the machines. He had finished the tests of one machine, and was proceeding with the tests of another when, at a height of about 2,000 feet, the motor evidently stalled. The latest communication that we have received stated that the body had not been recovered.

Jannus was cordially liked by everyone associated with practical aeronautics, for his airmanship and for his all-round excellent qualities. Much sympathy is extended to his brother Roger, who is worthily upholding the best in American aeronautics.

Chicago Aviation Field Officially Opened

The official opening of the U. S. Army Aviation field took place on Saturday, October 28th. The field is a mile square, being bounded by Seventy-ninth and Eighty-seventh streets, and Crawford and Cicero avenues. There are nine hangars.

Mr. John T. McCutcheon, the cartoonist, was the first member of the army reserve corps to make a flight at the station. Two other flights were made during the afternoon. One of the most interested spectators at Mr. McCutcheon's flight was Miss Evelyn Shaw, his fiancée. Although a stiff breeze was blowing from the south, neither appeared to be nervous.

The flights were witnessed by more than 500 spectators, many of whom went out on a special train. They were members of the Chicago Advertising club, who had accepted the invitation of the Aero club to attend the dedication of the aviation reserve station.

Capt. J. C. Morrow of the regular army flying corps, is in charge of the station. Aiding him are First Lieut. A. R. Christie, and five men from the aviation section of the army signal corps. There are now four new army planes at the field. Twelve more are expected. They will be used to instruct student officers and recruits in the aviation reserve.

"This is the largest station in the middle west and we hope to make it the largest in the country," Capt. Morrow said. "If we can get enough recruits we may have a hundred planes here next year."

The first flight of the afternoon was made by Theodore MacCaulay, one of the three civilian instructors detailed to the station. He remained in the air a half hour. A. Livingstone Allan was the next to ascend. The third instructor is J. D. Hill. Allan, early this year, enlisted in the British Royal Flying corps for six months. He saw three weeks' active service directing artillery fire over the German lines in Belgium and France. Then he came back to America to teach flying in the army aero reserve.

Export of Aeroplanes

Since our last report, the export of aeroplanes and parts have been as follows: To Great Britain, $81,841; to Denmark, $24,000; to Columbia, $117; to Italy, $3,156; total, $109,114.

Army and Navy Orders

First Lieutenant HARVEY B. S. BURWELL, 13th Cavalry, to Ft. Sam Houston for examination for detail in aviation section, Signal Corps.

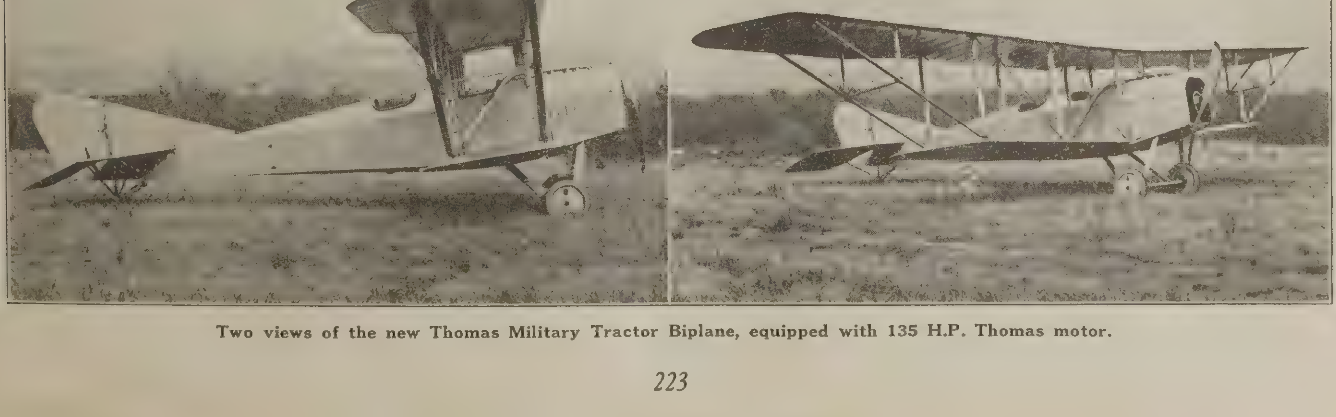
First Lieutenant RICHARD B. PADDOCK, C. A., detailed in Signal Corps, remaining on present duty.

Captain CLARENCE C. CULVER, Cavalry, detached officers' list, to Letterman General Hospital for examination for detail in aviation section, Signal Corps.

First Lieutenant DELOS C. EMMONS, 37th Infantry, attached aviation section, Signal Corps, as student, and upon expiration leave to Signal Corps, Aviation School, San Diego.

First Lieutenant EDWARD L. HOFFMAN, 24th Infantry, to Ft. Sam Houston, for examination for detail in aviation section, Signal Corps.

First Lieutenant JACK W. HEARD, 17th Cavalry, attached aviation section Signal Corps, as aviation student, to Signal Corps Aviation School, San Diego.



Two views of the new Thomas Military Tractor Biplane, equipped with 135 H.P. Thomas motor.

The Late Silas Christofferson

Silas Christofferson, a pioneer aviator and consulting engineer of the Christofferson Aeroplane and Motor Corporation at Redwood City, California, was killed October 31, when his machine overturned and fell one hundred feet at the trial flight of a new military aeroplane.

Christofferson was flying over the aviation field at a height of several hundred feet testing out a new control. He volplaned to an approximate height of one hundred feet, then seemed to lose control of his plane and plunged to earth. His wife and two brothers were watching the flight and ran to his aid. The injured aviator was hurried to a hospital, but expired soon after reaching there.

Christofferson was twenty-six years old. He was born near Des Moines, Iowa. He took up aviation in 1910, and made his most noted flight several years ago between San Francisco and Los Angeles, over the Tehachapi Mountains. He was very popular and generally liked by aeronautical enthusiasts throughout the country, and their sincere sympathy goes out to Mrs. Christofferson.

Theodore Marburg, Jr., Denied a Passport

Theodore Marburg, Jr., son of the former American minister to Belgium, has been refused a passport by the State Department.

Marburg lost a leg while serving in the British aviation corps and then came to the United States. He desires now to return to England, where he plans to serve as an instructor in the British aviation service. If he took the British oath of allegiance he lost his American citizenship.

Balloon School for Fort Omaha?

According to the Omaha *Bee,* General Scriven of the signal corps has recommended that Fort Omaha be made the first aerostatic division in the aviation section that has been accepted by the general staff, and that the first balloon school be established at Fort Omaha.

"We are going to spend money in the line of dirigibles and balloons," said General Scriven, "and I would like to see Fort Omaha a seat of learning for the study of aerostatics for the army. It's a wonderful big subject and its potentials are vast."

General Scriven stated that the gas tank would be immediately repaired and he hoped Fort Omaha would become the advanced training school for aviators of the army.

Monster Aeroplane Traveling on United States Tires

The gigantic flying boat built by the Curtiss Company for aerial ferry service between Port Washington, Long Island, and Atlantic City, New Jersey, has been shipped from Hammondsport, New York, to Port Washington, Long Island, by motor truck.

It was sent over country roads because it was too big even in "knock-down" form to go by freight or express.

The Curtiss Company having decided on this new method of shipment, insisted that the motor truck and trailer which were to carry this enormous 'plane (bigger far than the famous America), should be equipped with United States tires.

"They insisted on our tires," says Mr. J. C. Weston, director of sales of the United States Tire Company, "because after a careful study of service rendered by tires of various makes, Mr. Henry Wehman, of the Curtiss Company, found that United States tires give longer, more consistent service than the others.

"Consequently, in order to be certain that their immense Flying Boat would arrive at its destination on time, Mr. Wehman selected for their trucks United States 'Nobby' Tread Tires —long-mileage, anti-skids—that have more than proved up this season."

Personal Pars

Terah T. Maroney will make flights at the Annual Bee County Fair, Texas, November 9 and 10.

"Tex" La Grone made flights at the Prague fair last week.

Mr. and Mrs. A. R. Watts, of Westfield, N. J., recently received word that their son, Ruskin, twenty years old, a member of Squadron 19, of the English Flying Squad in France, has been missing since September 22. He joined the Royal Flying Squad in Canada. Last March he obtained a pilot's license from the Aero Club of America. He sailed for Liverpool on April 19.

Lucile Belmont's parachute drops at the Ottawa (Ill.) Business Men's outing last week attracted much attention.

Mr. Robert Thorpe, of New York and Houston, Texas, who is with the American Aviation Corps, it is stated, will marry Miss Bettina Freeman, the operatic soprano.

Roderick M. Wright, pilot for the Sturtevant Aeroplane Co., flew from Squantum, over Quincy, North Weymouth, Nantasket Beach, Boston & Jamaica Plains October 18th. At a period of the flight the aviator reached an altitude of 12,000 feet.

Artie Scott, known as the "Slim Count" throughout the central west voices his intention to desert the bucking bronchoes of the air and will hereafter saddle Pegasus, an equally dangerous steed.

The Imperial Welding Outfit

A practical, efficient and economical welding plant, built for continuous service, is being manufactured by the Imperial Brass Mfg. Co., of Chicago. The entire outfit, excepting the cylinders, is compactly carried in a hand grip.

Ten interchangeable tips are provided, fully adequate to weld all kinds of work from the thinnest sheet metal to the heaviest castings within the limits of the oxy-acetylene process. Each outfit includes an oxygen regular with 3,000 lb. gauge show tank pressure and contents, and a low presure gauge showing working pressure; a length of special high pressure hose for the acetylene and one length for the oxygen tank; a decarbonizing torch and hose; adjustable wrench; a pair of welding goggles; a supply of cast iron, Norway iron, bronze and aluminum welding rods, and fluxes for cast iron, brass and aluminum.

The outfit is furnished complete packed in a hardwood carrying case with a hand book and welding instruction. A two-wheel iron truck can be supplied for handling the tanks which are readily obtainable from service stations in most of the prominent cities.

U. S. Naval Training Station, San Francisco Bay, one of the four naval training stations maintained by the Navy Department. This view shows officers' quarters, barracks for men under training and parade ground.

Propeller Tests at Curtiss Plant

Aeronautical engineers are awaiting with a great deal of interest the propeller tests which are in course of progress at the present time at the Curtiss aeronautical laboratories in Buffalo. These propellers will include a solid aluminum alloy two-blade propeller, sheet steel propellers of the same size and approximate shape as the standard Curtiss propellers, wooden propellers with metal sprayed tips, wooden propellers covered with sheet celluloid, and solid celluloid propellers. Final shaping and mounting of the aluminum alloy propeller is awaiting instructions from the U. S. Army concerning a motor sufficiently powerful to run the blades to destruction.

The Aeroplane in Practical Surveying

Bird's-eye photograph taken from a hydroaeroplane in a flight over the University of Washington campus will form the basis for the establishment of the harbor line of Lake Washington along the lower line of the university property. Snapshots taken by John W. Miller, assistant professor of civil engineering, are now being used in remapping the shore lines.

The flight was made with E. Hubbard in one of T. T. Maroney's biplanes. Other flights and more pictures will be taken at intervals as the water recedes, and after it reaches the permanent level.

Though the photographic mapmaking is entirely a private affair, Prof. Miller is willing that his results should be used by the state in drawing the new shore line. He expects to show by his bird's-eye views that the harbor line already defined by a state survey and market by piles driven into the lake bed will make necessary a large amount of dredging. He says that the present harbor line, surveyed after the new lake level was known, is so close to the old shore line that much shallow water will be left along the new harbor line. He hopes to show this to be a fact by actual photographs.

Prof. Miller believes that five years hence the aeropane will be an absolute commercial necessity. In 1910 he suggested that the university open a course in aeronautics. He is now rejoicing over the possibilities opened by the gift of a aerodynamics laboratory to the university by W. E. Boeing.

The aeroplane, supplemented by the camera, would be a decided addition to the big surveyor's equipment, he says. A flight would assist him in gaining quickly acquaintance with a territory that he could otherwise gain knowledge of only through weeks of tramping and ground surveying.

Miss Wright Tries for Altitude Record

Miss Cecilia Wright, seeking to establish an altitude record for women, climbed to the height of 5,100 feet in a Standard aeroplane, equipped with a 135 horsepower Hall-Scott motor at Mineola field ,November 2. She was in the air 52 minutes. The machine used is the first that has been constructed entirely according to the Army plans and specifications and under Army supervision. Observers asserted that it withstood the wind in excellent style.

"Veedol"

The subject of lubrication is one which concerns the aeronautical constructor very importantly, and exact and useful information pertaining to the means of securing the most efficient lubrication of internal combustion motors is always of value.

Perhaps no other line of human endeavor has been clothed with such an impenetrable veil of mystery as has the refining of petroleum. Not only does this apply to processes of manufacture but as well to the peculiar characteristics of the final products themselves.

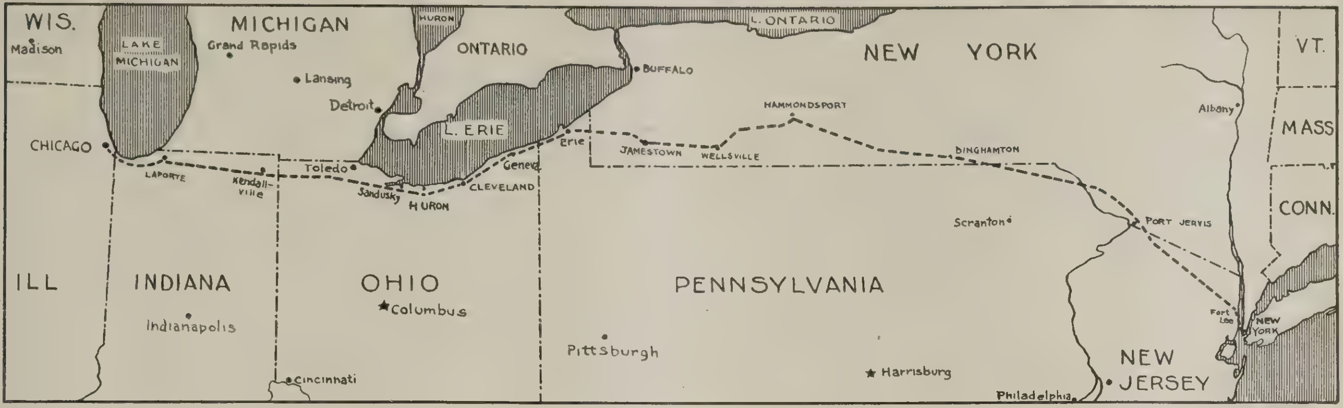
There is a wide diversity of opinion as to just what efficient lubrication is, and the right way of obtaining it. The book "Veedol," which has just been published by the Platt & Washburn Refining Company presents some practical facts on the subject. These facts have been ascertained from the results of many experiments and study of the operating conditions under which lubricants must work, and of the lubricants best suited to meet each and every peculiar condition found.

We cordially commend this small volume to our readers as an indicator of solution for their lubrication problems.

Militia Aeroplanes for Forest Patrol.

Minnesota State Forester W. T. Cox's suggestion that the Government aeroplane station to be established here next summer be made the basis of an aero forest fire patrol system, is approved by Captain Guy A. Eaton, commander of the Minnesota Naval Militia.

Captain Eaton, in recommending the idea, says the machine easily can perform the work of the 110 men whose maintenance and equipment is costing the state $50,000 a year.



CARLSTROM'S ACHIEVEMENT

VICTOR CARLSTROM, who understook to fly the Curtiss 200-horsepower military biplane, "The New York Times," from Chicago to New York between sunrise and sunset and without a stop, did not achieve all that he had planned, but he did travel 652 miles in six hours seven and one-half minutes, actual flying time, the 452 miles of this distance that lay between Chicago and Erie, Penn., being traversed without a stop in four hours, seventeen and one-half minutes, constituting a new American non-stop record.

Carlstrom's actual flying time between Chicago and New York was a wonderful demonstration of the utility of the aeroplane, as is shown by the following table:

Left Chicago (E. T.)	7:09:30 A. M.
Arrived Erie	11:27:00 A. M.
Left Erie	2:34:00 P. M.
Arrived Hammondsport	4:24:00 P. M.
Left Hammondsport	6:35:00 A. M.
Arrived New York	8:56:00 A. M.

	Time	Miles
Chicago to Erie	4:17:30	452
Erie to Hammondsport	1:50:00	200
Hammondsport to New York	2:21:00	315
Flight time	8:28:30	967

Average, 114 miles an hour.

When Carlstrom slid down on the air and touched the ground of Governor's Island at 8:56, it was four minutes before he had expected to arrive, and a longer period ahead of the time when even the most optimistic of those waiting for him had anticipated. He took every one by surprise.

A number of persons were in the hangar on the drill ground sheltered from the cool wind with the aid of which Carlstrom was flying to them at more than 130 miles an hour. General Leonard Wood was in his quarters and other officers were scattered about. A dozen or more persons were walking toward the drill ground, where it was known that Carlstrom would land. Henry Woodhouse and Augustus Post, of the Aero Club, and several others were stepping into the hangar.

Still others, including Alan R. Hawley, President of the Aero Club, were in New York, intending to go to Governor's Island and thinking that they would arrive ahead of the aviator.

But just about 8:55 o'clock some one looked up toward the west and saw a speck. The speck grew larger rapidly. It split into two dark lines—the planes of Carlstrom's machine—and,

"Here he comes!"

Mr. Post waved the flag of the Aero Club of America to greet the aviator and indicate the best place for landing. A whir, a dash—and Carlstrom's big machine was running over the ground, a hundred thrilled observers racing behind it, each hoping to be the first to shake the aviator by the hand.

But Carlstrom was not concerned with greetings and congratulations yet. His work was not done. Oblivious of the crowd, the cheering, the excitement in every one else, as soon as his engine was still he calmly began untying the bag of mail—the first ever brought from Chicago to New York by the air route—and the letters outside the bag addressed to President Wilson, Mayor Mitchel, General Wood, and Thomas A. Edison. These he delivered to the waiting messengers—and then his flight and the duties of it were over and he received the congratulations of those about him.

One of the first persons to congratulate Carlstrom was General Wood. Afterward, to a *Times* reporter, the General said:

"He made splendid time from Hammondsport. We didn't expect him so soon. And, of course, his whole flight was magnificent. I heartily congratulate both Carlstrom and the New York *Times*. Incidentally, Carlstrom has brought to Governor's Island the largest aeroplane we've ever had here."

(*Continued on page 227*)

Carlstrom's arrival at Governor's Island. From left to right: Henry Woodhouse, Lawrence L. Driggs, Maj. General Leonard Wood, Victor Carlstrom

EQUIPMENT FOR AERO UNITS OF THE AVIATION SECTION

THE following tentative list of equipment for aero units of the Aviation Section of the Signal Corps, United States Army, compiled and arranged by the commanding officer and officers of the First Aero Squadron, has been approved by Lieutenant-Colonel George O. Squier, and is published for the information and guidance of the Aviation Section.

The list is divided into four sections as follows: Initial equipment for an aero squadron with a mobile division; unit equipment of an aero squadron with a mobile division; equipment of an aero company; machinery, tools, equipment and supplies for an aero base.

Initial Equipment for an Aero Squadron

Experience with an aero squadron in garrison and in the field has demonstrated the fact that an aero squadron, upon receipt of orders for field service, should be equipped with a sufficient quanitity of supplies to maintain it for at least six months. One-half of these supplies can be easily carried into the "zone of advance" on the squadron truck transportation; the remainder should be held at the base as an available reserve during the time the base is being organized and equipped.

With the foregoing in mind, there has been prepared a tentative list of initial equipment for an aero squadron with a mobile division, including all supplies (exclusive of additional aeroplanes, aeroplane motors, and spare parts for the same) necessary to maintain one squadron in field service for approximately six months. This list comprises the following material:

Aeroplanes: Twelve aeroplanes, complete, with motors; spare parts, aeroplanes; ten motors, spare, for aeroplanes; spare parts, motors; material for constructing engine, cock pit, and propeller covers; spare tool kits, carried in aeroplanes. Transportation: Twenty-five trucks, spare parts; equipment and tools for motor trucks; one automobile; seven motorcycles. Hangars, portable: Twelve hangars

Tool equipment: Four sets of engine tools for repairs to motors; miscellaneous tools and testing instruments; twelve sets of tools for twelve flying sections; two brazing outfits; tools and equipment for the construction and fitting of two portable machine shops.

Miscellaneous: Photographic instruments and supplies; miscellaneous supplies; fuel for maintenance of motor trucks and aeroplanes, six months; miscellaneous instruments and supplies from supply depots; blank forms, binders, etc; filing cabinets, etc.; drawing instruments and materials; materials and supplies for maintenance of motor trucks and aeroplanes for six months; stock and material for portable machine shop.

The report then goes into the details of maintenance of aeroplanes, motor trucks, automobiles, motorcycles, hangars, tool equipment, photographic instruments and materials and miscellaneous supplies.

Unit Equipment of a Mobile Aero Squadron for Field Service

After the squadron has been fully equipped for six months' field service as outlined above, there follows a tentative list of unit equipment, including all supplies (exclusive of gasoline and oil) necessary for its maintenance in the "zone of advance" for three months.

The tools, equipment and supplies enumerated are based upon a twelve-machine squadron supplied with twenty-five motor trucks and are the result of the experience of the First Aero Squadron with the Mexican punitive expedition.

The advance of the expedition from Columbus, N. Mex., to Parral, Mexico, a distance of approximately 500 miles, was as severe a test of "supply and maintenance" as would normally be encountered. As a result of this experience it is believed that a trained squadron, supplied as herein indicated, will be able to maintain itself for three months under the most severe field conditions.

The First Aero Squadron, while operating within the zone of the line of communications of the punitive expedition, found it necessary to establish three "refilling stations" between the base and division headquarters, and this may be considered as a normal condition that will be encountered on any similar expedition. It has been demonstrated from this experience that the most efficient results are obtained only when the squadron establishes its own "refilling stations," with its own personnel and its own equipment, depending only on the Quartermaster Corps for the transportation of gasoline, oil, and other supplies after the stations have been established. The supplies and equipment enumerated for a "refilling station" will, under normal conditions, be sufficient for the maintenance of each station established.

The mobile Aero Squadron will consist of sixteen sections with equipment as follows:

First section (headquarters section), trucks 1 and 2: Headquaters office, automobile and equipment, photographic equipment and supplies, kitchen equipment.

Second section (engineer section), trucks 3, 4, 5 and 6: Machine shops, engine tools, magneto tools and spare parts, dunnage.

Third section (supply section), trucks 7, 8, 9, 10, 11, 12: Miscellaneous supplies, ordnance property, quartermaster property, tentage, cots, refilling stations, trunk lockers, spare parts for motorcycles, spare parts for aeronautical motors, records, dunnage, spare parts for aeroplanes, tank truck (truck 11), express truck (truck 12).

Fourth section (transportation section), truck 13: Tools and equipment for each truck, spare parts for truck train, aeroplane trucks.

Fifth-sixteenth section (aeroplane sections), trucks 14-25: Pilot, observer, records, chief of section, aeroplane equipment, motor box, spare box, tools to be carried into the field.

Miscellaneous: Individual equipment, motorcycle equipment, records.

The report adds an interesting note about squadron records.

Records.—The following extract from Squadron Order No. 39, First Aero Squadron, Camp Furlong, Columbus, N. Mex., June 15, 1916, is incorporated herewith for the information and guidance of all concerned, particularly the officers and non-commissioned officers charged with the keeping of aeroplane and flight records.

Official Diary (Officers).—Memorandum books will be furnished by the Squadron supply officer. Every officer will keep up the diary personally. He will carry the diary with him on every cross-country flight, and in the event that he fails to return on the same day he will enter all information necessary in regard to time, distance, places visited, and all aeroplane and motor data, which, upon return to base, will be transferred immediately to the section records.

Daily Records (Aeroplane).—Blank forms will be supplied by the Squadron supply officer. This record will be kept personally by the officer or non-commissioned officer in charge of each aeroplane section. Each daily sheet will be initialed, after a careful check, by the officer in charge of the section. If there is no officer in charge, then it will be checked by the non-commissioned officer in charge. Upon the destruction or condemnation of an aeroplane this record will be completed immediately and turned in to Squadron headquarters.

Aeroplane Descriptive Lists.—Blank forms will be supplied by the Squadron supply officer. This record will be kept personally by the officer or non-commissioned officer in charge. It will be kept up to date at all times and will be turned in to Squadron headquarters every Monday morning, not later than 8:30 A. M., in order that all necessary data for the weekly Squadron reports may be obtained. Upon the destruction or condemnation of any aeroplane the descriptive list will be completed immediately and turned in to Squadron headquarters.

Motor Descriptive Lists.—Blank forms will be supplied by the Squadron supply officer. This record will be kept personally by the officer or non-commissioned officer in charge. It will be kept up to date at all times and will be turned in to Squadron headquarters every Monday morning, not later than 8:30 A. M. Upon the destruction or condemnation of a motor this record will be immediately completed and turned in to Squadron headquarters. Upon the transfer of a motor to any person this record will be immediately completed and turned in to Squadron headquarters for delivery to the person to whom the motor is transferred. If any officer to whom a motor is transferred fails to receive the motor descriptive list within 24 hours after receiving the motor the officer receiving the motor will make immediate report of its non-receipt to the Squadron headquarters.

Monthly List of Expenditures.—Blank forms will be supplied by the Squadron supply officer. This report will be submitted in duplicate to Squadron headquarters not later than the 3d of the following month.

Weekly Aeroplane Report.—Blank forms will be supplied by the Squadron supply officer. This report will be kept up daily by the officer or non-commissioned officer in charge of the section. At the end of each week all necessary data regarding flights, etc., will be transferred to the aeroplane descriptive list. The weekly aeroplane report will then be turned in to Squadron headquarters every Monday morning not later than 8:30 A. M.

Truck Records.—Memorandum books for truck drivers to be furnished by the Squadron supply officer. Driver's memorandum books will be turned in every Sunday morning to the officer in charge of the fourth section, who will check them and see that the proper entries are made. (The two shop truck books will be checked by the engineer officer.) At the end of each month the officer in charge of transportation and the engineer officer will submit a report showing the total amount of gasoline, oil, grease, etc., received by the trucks during the month. This report will be submitted to Squadron headquarters not later than the 5th of the following month, and will be submitted on the Squadron blank form consolidated motor truck report).

Automobile (*Cadillac*).—Memorandum book to be furnished by the Squadron supply officer. This book is to be turned in every Sunday morning at 9 A. M. to the Squadron commander to check each item entered. At the end of each month the non-commissioned officer in charge of the Squadron automobile will consolidate all gasoline, oil, grease, etc., and enter them on the consolidated motor truck report. This report will be turned in to Squadron headquarters not later than the 5th of the following month.

Motorcycle Reports.—All motorcycles will be turned in to the Squadron supply officer for official use. The Squadron supply officer will assign these motorcycles to such use as may be necessary. Records will be kept of gasoline, oil, and spare parts used throughout the month. The record of expenditures will be consolidated at the end of the month and included in the consolidated motor transportation report of the Squadron.

All section records, except the the official diary (officer's), will be kept with the section property and not in the personal possession of the officer or noncommissioned officer in charge of the section. Each section will provide itself with a small record chest, in which all blank forms and records will be kept. All officers and noncommissioned officers in charge of sections will anticipate their needs as regards keeping a sufficient supply of the necessary blank forms at all times.

Equipment of an Aero Company

Part three of the report deals in detail with the equipment of an aero company and concerns ordnance supplies, medical supplies and quartermaster supplies.

Machinery, Tools, Equipment and Supplies for an Aero Base

When an aero squadron enters the "zone of advance" it should not be required to detach men to remain behind at the base. To perform its proper functions in the "zone of advance" efficiently it will need every member of the squadron to perform its duties with the division to which it is attached and to maintain such "refilling stations" in the "zone of the line of communications" as may be necessary.

To maintain properly an aero squadron in the "zone of advance" it should have a base in its rear from which all supplies could be drawn. The following schedule contemplates and provides for a six months' supply of all material necessary to maintain one squadron. It also provides shop machinery and tools for the maintenance of from one to four squadrons.

In addition to keeping on hand a six months' supply of general supplies and material, a base should also keep on hand reserve aeroplanes and aeroplane motors. All reserve aeroplanes should be received, inspected, and accepted at the base and put in fit condition for immediate service. That is, they should be ready at all times for immediate service when called for from the front. An efficient base should therefore be equipped with the necessary shops, tools, and general equipment necessary for the assembly, test, and repairs of all aeroplanes and motors received.

To maintain and operate a base efficiently a personnel trained in the care, repair, and operation of the different types of aeroplanes and motors is absolutely necessary. An aero squadron should not be hampered in its field operations with unreliable aeroplanes and motors, nor should it be required to test all aeroplanes and motors with which it is supplied. Work of this character is a proper function of the personnel at the base.

The supplies and materials required at a base for six months' maintenance include:

Equipment for base or garrison machine shop; metal stock, machine shop, and supply department; stock, machine shop; photographic supplies; tools for replacement of tools broken or lost; drawing material; aeroplane spare parts; motor spare parts; two-ton trucks, spare parts; motor-cycle spare parts; magneto spare parts; magneto tools, and repair department.

New York-Newport Passenger Lines Contemplated

Those dreamers who a few years ago were laughed at for maintaining that "aviation has stepped on the threshold of the practical stage and is starting on the career of utility" are on the point of seeing their dreams realized. The establishment of a line of passenger-carrying hydro-aeroplanes, plying between New York and Newport, is seriously being considered.

A few days ago there was tested in Hammondsport, N. Y., the largest flying boat ever built. It rose from Lake Keuka with eleven passengers seated in the cabin. The pilot made the twelfth member of the party. Climbing gracefully to a height of 500 feet, it circled above the lake. The landing was remarkable for its accuracy.

This particular boat was built for a well-known American sportsman. It will be used as a pleasure craft. But others, some even larger, are to be constructed.

The Hammondsport craft has a wing spread of 76 feet. It is equipped with two eight-cylinder motors of 100 horsepower each. The propellers are pushers, somewhat like those upon the famous "strawberry crate" in which Wilbur Wright flew around the Statue of Liberty in 1909.

It is capable of a speed of 60 miles an hour—considered slow by aviators. Forward are two pilots' seats and aft in the cabin are seats for five or six passengers. Twelve were carried in the recent tests, but only for test purposes.

New Yorkers who repair to Newport in the spring of 1917 may be ready to buy passage on the New York to Newport Air Line and fly in safety and comfort to the Rhode Island resort.

British Aeroplanes in Search for U-Boat?

British aeroplanes are reported to be sweeping the Atlantic ocean in search of German submarine U-53.

According to reports the aeroplanes left Halifax for the vicinity which the Greek steamer Patrie, reported being stopped by the raider.

(*Continued from page* 225)

General Wood looked at the big biplane with admiring eyes. One could read in them his desire for great numbers of others like it owned and operated by the United States Army. Two of the aeroplanes regularly stationed on the island stood on the field beside Carlstrom's machine, and, although no one had considered them small before, they looked diminutive and overshadowed by the far-reaching sixty-six-foot wings of the New York *Times* flier.

The Aero Club officials present were jubilant. Mr. Woodhouse especially.

"It was a beautiful flight," he said, "and it has proved the practicability of aeroplanes for mail service and other utilitarian purposes. The *Times* deserves much credit for its public spirit in showing to the world the advancement that has been made in aeroplane and motor construction in the last year.

"This flight shows that a permanent air line could be established between New York and Washington, Baltimore, Buffalo, and other cities within a radius of 500 miles for the delivering of morning newspapers and important mail. This would enable these cities to receive the metropolitan papers several hours ahead of the present time of delivery."

Mr. Post, who was an aviator himself in the early days, said:

"Next year the Aero Club of America will hold the transcontinental aeroplane contest, in which the aviators will fly from coast to coast, proving to the whole country what wonderful developments have been made since the European war. A Pan-American exhibition will be held in the Grand Central Palace next February, when all the latest and best machines made will be shown, and at which delegates and sportsmen from the South American republics will be present.

"The New York *Times* is to be most highly congratulated upon its public spiritedness in arranging this epoch-making event, which will do more than any other one thing to advance the cause of aeronautics in this country."

Carlstrom brought more than 1,000 letters and postcards addressed to people in various parts of the country, including President Wilson, Colonel Roosevelt, Major Gen. Leonard Wood, Thomas A. Edison, Postmaster General Burleson, Governor Whitman, Mayor Mitchel, Alan R. Hawley, President of the Aero Club of America; Henry Woodhouse, Cardinal Farley, Frank A. Vanderlip, and Felix M. Warburg.

The mail was received on the aviation field by Assistant Superintendent of Mails John W. Tiedemann of the New York Post Office, official representative of Postmaster Edward M. Morgan. The pouch was immediately taken to the General Post Office, and within less than half an hour after Carlstrom landed the letters and postcards were being delivered to the New Yorkers to whom they were addressed, while the mail to persons outside New York was sent out on the first trains. The letters to the President, Mayor Mitchel, General Wood, and Mr. Edison were carried outside the mail pouch, and were hurried by special messenger to the addresses.

An interesting packet of postcards brought by Carlstrom will go by the German submarine Deutschland to Germany. In that packet are cards to the German Emperor, Field Marshal von Hindenburg, Dr. von Bethmann Hollweg, the Imperial Chancellor; Herr von Jagow, the German Foreign Minister; other high officials of the German Government, and to the editors of the *Berliner Lokal-Anzeiger*, the *Berliner Tageblatt*, the *Berliner Volkszeitung*, the *Cologne Gazette*, and the *Berliner Zeitung*.

BURGESS TYPE "U" SEAPLANE

One of the Type "U" tractor seaplanes, recently completed at Marblehead and delivered to the Massachusetts Naval Militia, underwent exhaustive tests of its general efficiency, the results of which we are able to present in a complete account.

The speed range which averaged 40-67.9 miles per hour with and against the wind, was taken last month by Lieut. G. S. Gillespie, U. S. N., over a carefully measured course. Other calculations of areas, weights, capacity and performances have been accurately worked out in detail.

General Dimensions

Span-top	46′ 9″
Span-bottom	38′-3″
Chord	6′-3″
Gap	6′-0″
Length over all	30′-5″
Height	11′-2″
Weight, empty	1798 lbs.
Useful load	558 lbs.
Speed range	40.-67.9 MPH
Best Climbing rate	210 ft. per min.
Best Gliding Angle	1 in. 7.5

Planes

Upper plane in 3 sections; central section 14′-7″ in length, outer sections each 16′-1″. Total surface, 235 sq. ft. Ailerons, hinged to upper plane, each 11′-6″ length, 1′-9″ wide at inner end and 2′-3″ at extreme tip. Aileron area 45 sq. ft.

Lower plane in two sections one at either side of body, each 18′ in length, area 220 sq. ft.

Chord of upper and lower planes, 6′-3″. Forward main beams 6″ from leading edge; rear main beam 4′-6″ from leading edge. Trailing edge 1′-9″ from rear main beams. Factor of safety in wing construction, six.

Inverted "V" struts separate upper plane from the body. Struts located 7′-3″ from center of machine; outer struts 9′ from these, or a distance of 16′-3″ from the center. From the outer vertical struts, a pair of diagonal struts support the upper plane. Supporting area of planes 500 sq. ft., loading 4.8 lbs. per sq. ft.

Total weight of wings, with struts and wires 520 lbs. Weight of ailerons 40 lbs.

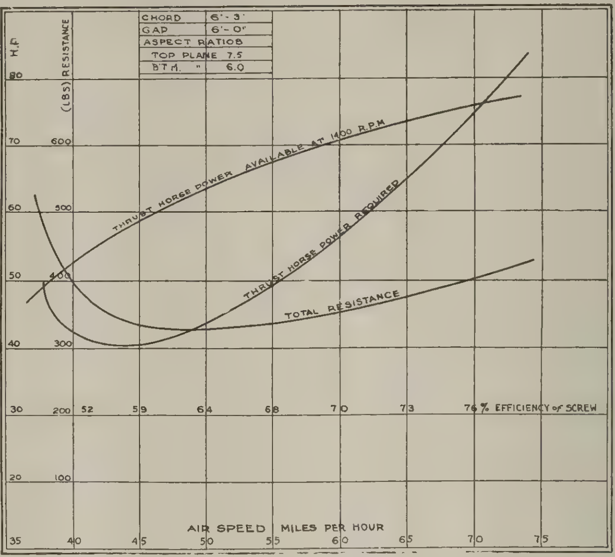
Body

The body or fuselage is 24′-8″ in length, 2′-3″ wide from the radiator to a point 6′-0″ forward from body termination, where the body is curved in a gradual taper to a blunt termination.

Upper main longitudinal members of the body are located at the center of the propeller thrust, running back in a straight line. Cowling for the motor and cockpit shields extends 1′-6″ above the body, in a rounded-off form.

Lower main members of the body are run in a stream-line curve from the radiator to the termination. Greatest depth at the rear struts where distance from lower to upper body-beams is 2′-4″. Depth over all, including the cowling at this point, 3′-11″. Depth at termination 1′4″. Net weight of body 200 lbs.

Provision is made for the comfortable accommodation of the pilot and passenger, whose weight during the tests, was figured at 320 lbs. Dual Dep control is installed.



Performance Curves of the Type "U" Seaplane

The stabilizing plane is attached 2″ below upper main body members, from the point where body begins to taper, 6′ from termination. Length of stabilizing plane, from tip to tip, 11′-0″.

Elevators, over-all width, 2′-8″. Distance from tip to tip 11′-11″. There is a space of 10″ between elevator flaps, where the rudder swings. Area of elevators, 24 sq. ft., weight 20 lbs.

A stabilizing fin 6′-0″ long, is attached to body, 2′-3″ high at the end where rudder is hinged. It has an area of 10 sq. ft.

Rudder is of the balanced type, greatest distance forward of the pivot, 1′-1″; greatest distance to the rear of the pivot, 2′-1″. It extends 1′-8″ higher than the fin. Total rudder area, 10 sq. ft., weight 15 lbs.

Pontoons

Main pontoon or float 19′-0″ long, beam 2′-4½″, depth at step 1′-10″.

Attachment to the body is made by streamline struts. First pair of struts spaced with their centers 3′-2″ back of forward edge of pontoon; from this point struts make attachment near radiator. Second pair of struts 4′-8″ further back; these struts attach where forward beam of wing attaches to body. Third pair 5′-3″ further back; this pair tilts forward to the point where rear beam of wing attaches to body.

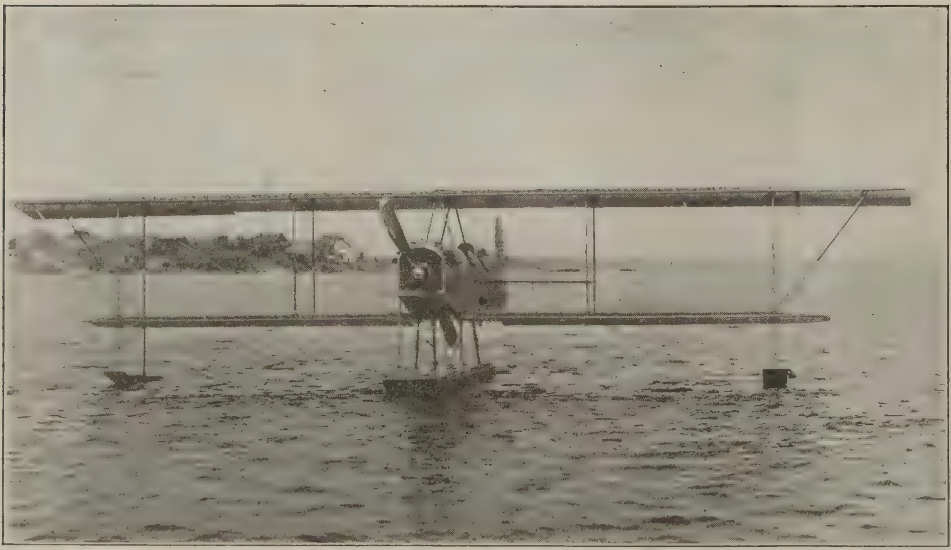
End of pontoon extends 5′-11″ back of the last of these struts. Totaling these distances gives 19′-0″.

Forward float struts, 3′-5″ long, central struts, 2′-6″ long, rear struts 2′-6″ long. At the rear struts the body is 2′-3″ above the pontoon.

A 2″ planing step occurs 10′-0″ from front of pontoon.

Weight of main pontoon 350 lbs. Total immersion displaces a weight of 3,940 lbs.

Wing floats, over-all length, 6′-6″, width, 14″. Greatest depth 7″. Attachment to wings is made by struts in continuation of outer wing struts. Forward strut, 2′-6″, rear strut, 2′-7″ long. Weight of wing floats, 70 lbs. Total immersion displaces 180 lbs. each.



Motor Group

Curtiss OXX-2, 8-cylinder, 100-H.P. motor. Burgess tractor airscrew, diameter 7.75′, pitch 5.3′, turning at 1,400 R.P.M.

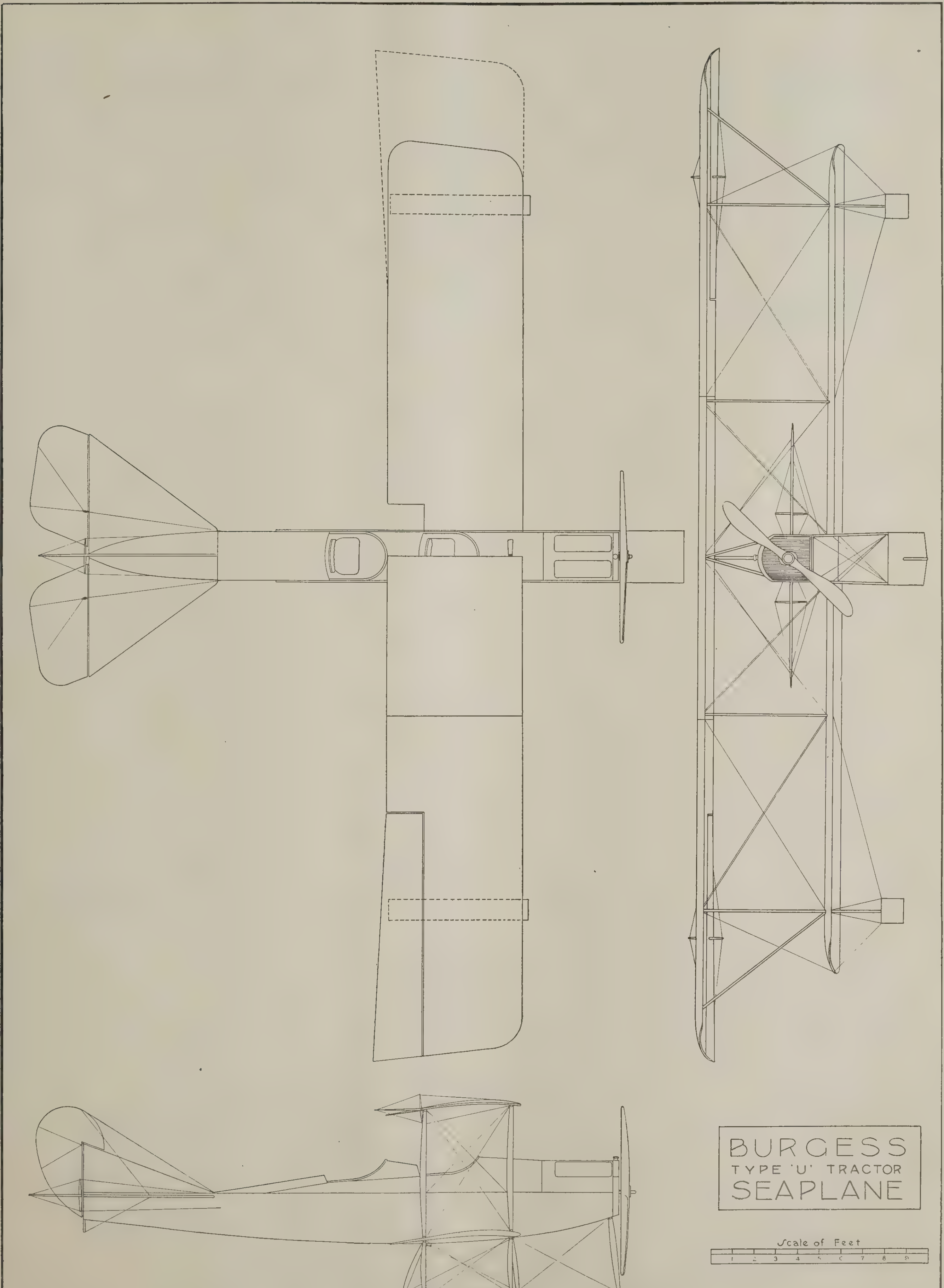
Weight carried per H.P., 24 lbs.

Motor is enclosed in a removable housing extending 3′-7″ back of the radiator.

Weight of motor complete, 450 lbs.

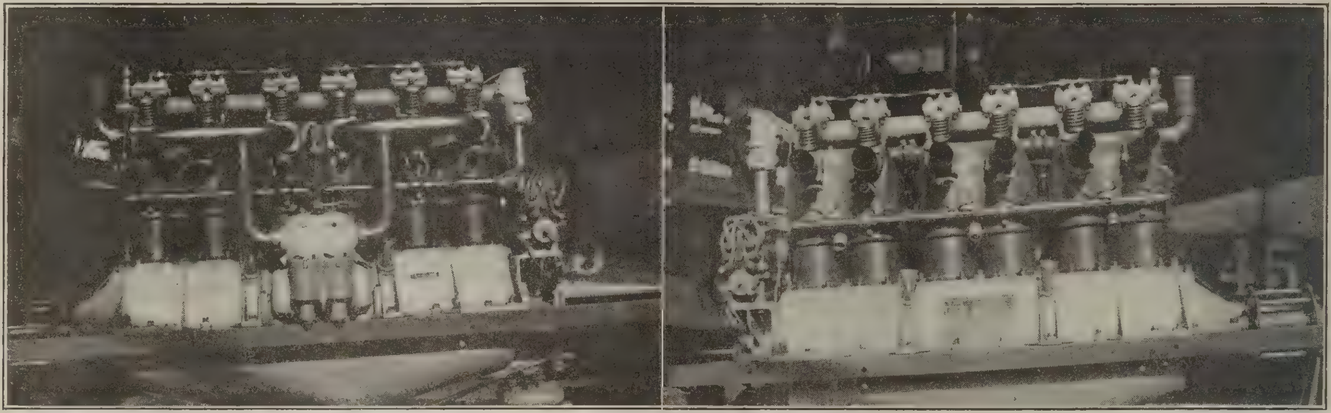
Fuel capacity, gas 30 gal., weight 180 lbs.; oil 4 gal., weight 28 lbs.

Radiator weighs 76 lbs., 5½ gals. of water are carried, weighing 44 lbs.



BURGESS
TYPE 'U' TRACTOR
SEAPLANE

SOME FOREIGN AERO ENGINES

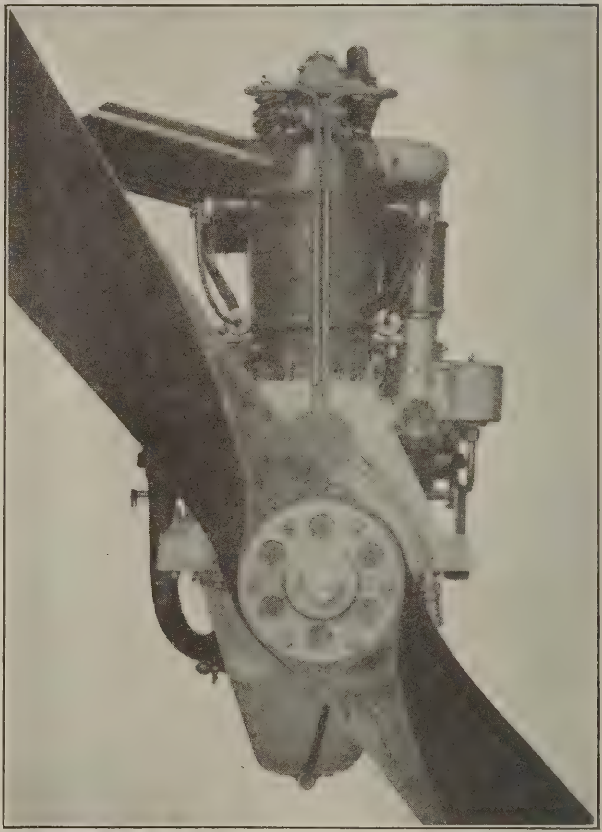


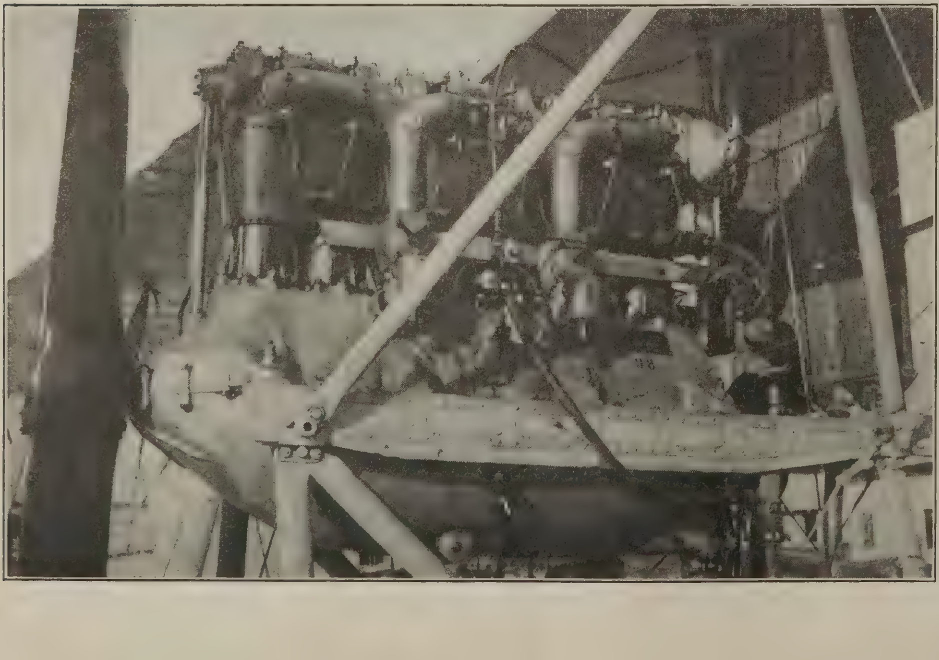
Mr. Harold Kantner, the veteran American aviator and aero motor expert, who has been in Italy as instructor for a year or so and has just returned, has supplied Aerial Age with interesting information regarding aeronautic motors used in Italy.

We reproduce herewith photographs of several prominent Italian motors brought back by Mr. Kantner—who, by the way, is open for engagement.

The top illustrations present the intake and exhaust sides of the 100 H.P. Fiat aviation engine, which is being extensively used in Italy, and which is manufactured in Turin. It is built in two sizes, both are vertical, one delivering 60 h.p. and the other 200 h.p. The motor has mechanical inlets and forced lubrication. The small motor weighs 220 lbs., and the large 1,443 lbs.

The views below are of the Italian Isotta-Fraschini aero engine manufactured in Milan. The motor is made in two sizes—150 and 200 H.P., the former weighing 1,200 lbs. and the latter 1,600 lbs. Both are vertical, with mechanical inlets and forced lubrication (pump). The special features of the motor include overhead inlets, horizontal exhausts, special radiation, and Zenith Carburetor.





The Isotta-Fraschini aeronautic motor, used extensively by the Italian navy.

FOREIGN NEWS

CHINA

Miss Chiang, the daughter of General Chiang Tso-Ping, a member of the Chinese General Staff, was dangerously injured in an aeroplane accident at the first public exhibition of the Army aviation corps recently held at Nanyuan, near Peking. She made the flight with one of the best aviators in the Chinese Army.

Adverse air currents interfered with the manipulation of the machine, which dropped from a height of several hundred feet within sight of thousands of spectators who attended the exhibition.

The pilot wore a heavy safety helmet and escaped with slight injuries, but Miss Chiang wore no helmet and sustained concussion of the brain.

The aviation meet continued for two days and attracted immense crowds from all over North China. Ten Army aeroplanes participated. Flights were made both in biplanes and monoplanes by Chinese aviators, who showed great skill. Most of the aeroplanes used were built by the Chinese under the direction of French mechanics.

FRANCE

A report recently came from France that two American aviators were killed near Nancy. The report gave little detail about the unfortunate accident and did not give the names of the men.

The "Matin" said that the aeroplane containing the two men capsized while flying over the Boundonville plateau, near Nancy. The observer fell out and the pilot, who came down with the machine, was crushed to death beneath the engine. Later reports, however, give the information that the information was not verified and that no American aviators had been killed since Norman Prince.

GERMANY

A report from Zurich states that an Allied aviator dropped a bomb on the train in which the Kaiser was riding, killing the engineer. The dispatch did not give any details.

It now comes to light that Captain Boelke was killed in a collision with another German aeroplane.

Although Captain Boelke's machine was seriously damaged at an altitude of 2,000 feet he retained control of it until he had descended about five hundred feet where he encountered a sudden gust of wind and the machine crashed to earth. According to a comrade of Boelke's, who spoke at his funeral services, the body showed no bullet wounds and death resulted from a fractured skull.

After impressive funeral services Captain Boelke's body was sent to his home at Dessau. The services were attended by Crown Prince Rupprecht and many of the highest officers of the German Army.

GREAT BRITAIN

The more we read of the aerial side of the Great War, the more are we impressed with the chivalry between the aviators of the warring countries, and the unbounded admiration with which they are held by the men in the field.

A late dispatch from London gives out the information that some British officers, imprisoned at Osnabruck presented a beautiful floral wreath for the coffin of Captain Boelke, killed recently. The dispatch adds that a telegram from the British officers, asking permission to present the wreath, characterized Captain Boelke as a much-admired and honored enemy.

ITALY

A fight between an Italian dirigible airship and an Austrian aeroplane at a height of more than three miles above the Albanian coast, resulting in the aeroplane being shot down and the dirigible afterward being destroyed by its own officer inside the Austrian lines, was described when King Victor Emmanuel conferred medals for valor on three members of the Italian air corps.

On the morning of October 12, while off the Albanian coast, an Italian dirigible, piloted by Captain Ercole, with Captain Corbelli and Captain Albino as observers, was surprised and attacked at a height of 16,000 feet by an Austrian aeroplane.

The aeroplane, on obtaining a favorable position, turned its machine gun on the dirigible, mortally wounding the observers and disabling Captain Ercole's left arm. Ercole, according to the official account, succeeded in overcoming the aeroplane and in killing the pilot, but the dirigible was obliged to land thirty miles within the enemy lines.

Captain Ercole destroyed the dirigible and, after two days of wandering and suffering from cold and hunger, managed to elude the Austrians and, recrossing the mountains, finally reached the Italian camp on the River Voyusa.

King Victor Emmanuel to-day conferred a gold medal for valor on Captain Ercole and silver medals on Captains Corbelli and Albino.

JAPAN

The following is from the Tokyo "Times" of September 13, which has just come to hand:

"The Aviation Corps of Tokorozawa initiated a long-distance flight yesterday. The aeroplanes belonging to the Corps left Tokorozawa and prooceeded to Ichinomiya, a distance of one hundred and twenty-five miles from Tokyo. The schedule is to make the distance in one hour and a half, and only three stops are allowed en route. The aviators who left yesterday from Ichinomiya returned to Tokorozawa in the afternoon, but today other aeroplanes will be sent over the same route.

"In the Grand Maneuvers to be held this November in Kyushu, twenty-six aeroplanes will participate, and the Aviation Corps is planning a flight to Kyushu, a distance of sixteen hundred miles. It will be the longest flight so far undertaken by Japanese military aeroplanes, and the Army aviators are now preparing for the record flight. It will also be the first maneuver in which so many aeroplanes participate. In the coming maneuvers twenty-six aeroplanes will be engaged for scouting purposes and dropping bombs."

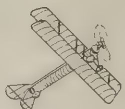
In spite of the heavy rain yesterday morning, five officers of the Army Aviation Corps started on their flight to Ichinomiya. Lieutenant Matsuoka left Tokorozawa at 5.50 yesterday morning, and arrived at Ichinomiya at 7.20, making the distance of one hundred and twenty-five miles in one hour and a half. After resting one hour at Ichinomiya he started on his return flight, and although he encountered heavy rain, he reached Tokorozawa safely at 9.40.

Other four officers also left Tokorozawa yesterday morning, and made the trip successfully, all returning in one time. Lieutenant Kawabata, however, missed his way on account of the heavy rain as soon as he left Tokorozawa, and had to return, but in a few minutes he again started for Ichinomiya and successfully made the trip.

Dr. Kishi, one of the foremost Japanese aeronautical authorities, is now planning to open an aero traffic line between Tokyo and Osaka. Dr. Kishi has been greatly encouraged with the success of his aeroplane "Tsurugi," which was entirely constructed in Japan and installed with a motor of his manufacture, and he is at present working on the construction of two new aeroplanes. One is a small machine of one hundred horsepower suitable for looping-the-loop, and another is a flying machine with a new attachment for regulating the speed. The latter is equipped with a flexible plane which, it is reported, will lessen the wind resistance when flying.

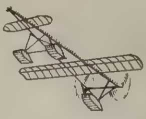
Dr. Kishi greatly regrets that no one in Japan has attempted a continuous flight between Tokyo and Osaka, and realizing that the commercial communications between the two cities are becoming more and more important he believes that the opening of an aeroplane service would greatly facilitate traffic between the two places. It is his opinion that the distance between Tokyo and Osaka could easily be traversed by an aeroplane in five hours. Three or four machines will be used on the Osaka-Tokyo line, and it is reported that as soon as his machines are completed he will experiment on the operation of the aero-line between Tokyo and Osaka.

The remains of a Zeppelin recently brought down on the outskirts of London.



MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



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Oxford, Pa.

A Dunne Type Model Aeroplane

Although the Dunne biplane has been manufactured extensively in America as a large machine, its principle has been little applied to model construction. It belongs to the "inherently stable" class and is characterized by the absence of the tail or forward planes. This 34-inch model Dunne was made with a view to adopting the principle and general dimensions to a model without sacrificing its simplicity or flying qualities. While this model may appear complicated at first sight, it is comparatively easy to construct.

In the construction of this model it is well to begin with the motor stick or fuselage. This is made of a piece of spruce, 30 inches long, 3/16 inch wide and ⅜ inch thick. The wood used for this piece must be light and clear grained, so that it will not split or break easily. At one end of this stick is fastened a propeller hanger, and at the other end a hook for the rubber strands. It is then sandpapered and given a coat of shellac varnish.

The planes of this model, aside from their backward slant, are constructed much the same as those of any other model. The necessary sticks are as follows: Eight main beams, 20 inches long, ⅛ inch wide and ¼ inch thick, and 16 ribs, 5 inches long, 1/16 inch wide and 3/16 inch thick. To make the planes, it is well to lay out the general plan of the model on a large piece of heavy wrapping paper, and then assemble the different parts by laying them over the corresponding parts on the plan and fastening them together. In this manner of construction the model will be more symmetrical and have better balance than otherwise. The motor stick, to which the planes are fastened, is then laid on the large paper plan and the two points where the main beams fasten onto it are found and fastened onto it, using a small wire or a thread. The end ribs are next bound to the beams and then the remaining ribs are added at intervals of 5 inches apart. The top plane is made in the same way, except that a stick 6 inches long, ⅜ wide and 3/16 inch thick, is substituted for the motor stick, and the upper plane built up with it as a center. A piece of the 1/16 x 3/16-inch stick should be fastened across the front of the "V" to brace it. The ribs of this model are not bent or chamfered, but are left flat.

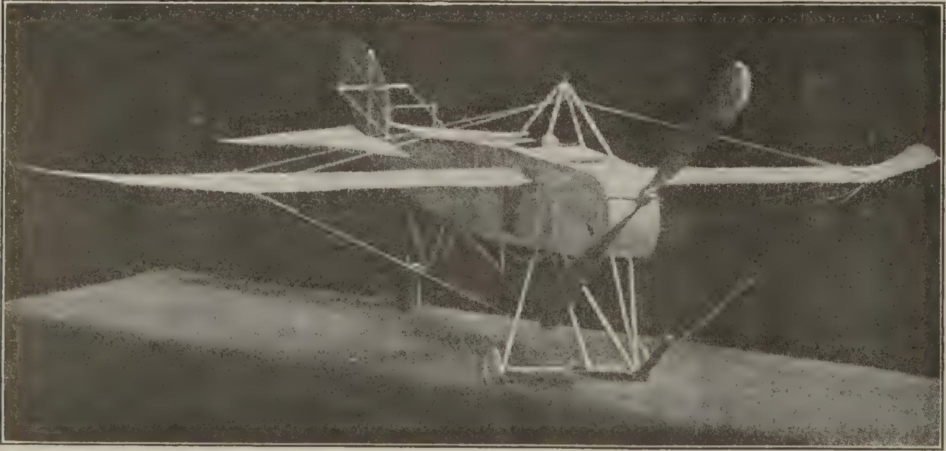
The planes of the model are now ready to be covered. Any light, tough paper will do, although the so-called "bamboo fiber paper," sold by the various model supply houses, is about the best for this purpose. To cover the framework for the planes it is laid upon the paper that is to cover it and the outlines are marked around the edges of the plane. The framework is then removed and the paper cut out. In cutting, be sure to cut about ¼ inch outside of the outline to allow for a lap. When ready to apply, dampen the paper slightly with a moist cloth and then glue it to the plane framework while damp. As the paper dries out it will shrink slightly, and when dry, it will form a smooth, taut surface.

The planes are now ready to be placed, one on top of the other, by setting the uprights in between the planes in the positions marked with the dots in the top view drawing. These uprights are 6 inches long, ¼ inch wide and ⅛ inch thick. They should be well sandpapered so as to round off the corners and then finished with shellac. They may be fastened in place by driving a small brad through the main beam and into the end of the upright.

In guying the plans for this model, it is necessary to use care, as the success of the finished plane depends largely on the manner in which it is wired. In this type of machine, stability is secured through the slant given to the wing tips. In the large machines the forward edge of the wing is slanted downward, thus making the rear edge higher than the forward edge at the wing tips. In the model, instead of sloping the forward edges downward, the rear edge has been sloped upward, producing practically the same result. In wiring up the model, it is best to lay it on some flat surface, such as the top of a table. The wiring along the front edge is first put in. The planes should be wired so that the front edge lies perfectly flat along the table top. The rear edge is wired to lie parallel to the front edge as far as the ends of the two sections on either side of the motor stick. The outer section on each end is given an upward slant so that the rear tips of the wings are raised 1 inch above the level of the table top. This can be clearly seen from the front and side view drawings.

The propeller fitted to this model is one of large diameter and rather flat pitch. It is made by taking a piece of wood 15 inches long, 1 inch wide and ¾ inch thick and cutting it to shape. The two diagonals are drawn from the ends in order to find the center, and the hole for the shaft is then drilled. Be sure to have this hole drilled accurately or the propeller will not run true. After boring the hole, cut out the blades with a sharp knife. The wood should be cut away diagonally until the opposite edges of the stick form the edges of the blade.

(To be continued)



A steam driven monoplane model, cleverly designed and constructed. The steam power plant offers many possibilities to the model constructor.

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Tests for Pilots of Reikavieakzz

We are able to give, this week, a résumé of the examination which all aspiring pilots of Reikavieakzz have to undergo before being admitted to the Royal Aeroplane Corps, Submarine Division:

(1)—Name and locate at least six undiscovered islands in the Pacific Ocean.

(2)—Who invented the aeroplane? When? Why? Give reasons.

(3)—How many revolutions a minute in rough figures? Prove your answer.

(4)—How many gallons of gasoline are required to run an eight-cylinder motor which is quite powerful?

(5)—Which is more efficient, an eight-cylinder motor with a four-foot propeller or a four-foot motor with an eight-cylinder propeller? Is this the case with the conditions reversed? Who?

(6)—If on attaining a height of eight thousand three hundred and eighty feet seven and a half inches, it is found that the motor has been left on the ground what is the correct procedure?

(7)—Give the history of your life. (You may omit embarrassing details.)

(8)—In as many words as possible (one hundred at most), give the history of aviation.

If the pilots pass this test and still retain their sanity, they are put through another ordeal.

They are first hit upon the head with a one-hundred-pound hammer nine times to accustom them to falling from great heights and landing upon their craniums. If they still live after this test the examiners do not give up hope but go at the thing more seriously. While a cake of ice is held against the aspirant's stomach, molten lead is poured into his ears. This is calculated to accustom him to rapid changes in temperature. He is then put to work upon the stock-books of some mining company, which gives him a perfect idea of balance. Then follows the hardest test of all. He is led into a room in which are seated ten cullud gem'men and he is given a quick glance at their faces. If after three days he still can remember them, he is judged an expert in map-reading. Then if he has passed through all these ordeals, and the committee finds it absolutely impossible to find some test which he cannot pass, he is put in jail for defying the officers of the Government.

The Aeroplane?

Wither, fair maid, in thy aero car?
Wither? Thou goest? The storm is not far,
No more than the petrel, the storm signs mind we,
A grand message to Earth is entrusted to me.

So spake the strange man, from the lone star,
To the outward bound maid, in the aero car;
So answered the maiden, with mind lifted high,
The stranger who questioned, from the far sky.

The plane carried roses, rich scented, all gay,
Red, rare, so beautiful as a dawning June day.
My journey o'er Earth is ended when? When
I've scattered these roses to the hearts of all men.

Lives Lost!! Easy my task now, through the great plane;
Not from labor or thought could its builders refrain;
With patience untiring they have conquered the air,
Undaunted, with Science as master, they sail everywhere.
All, each country to country, in brotherhood bound;
Love, sister as sister, will in future be found.
Gaunt greed, erring error, wide war, all will wane,
Crushed by progress, by the great power of the aeroplane.

Skyman, my message take thou, to thy far lone star,
Tell thy peoples to build there, the white winged car.

—Emma A. McCabe.

Requiescat in Pace

We announce this week the saddest piece of news we have ever been forced to give out. Only by the greatest strength of mind can we force back the tears which persist in welling up into our eyes. Knowing the care and sorrow that this great war has caused, we have struggled long before announcing this terrible misfortune. Lord Stephen Stewbum is dying. This great nobleman whose exploits we have been fortunate to announce was serene in his confidence that he came of noble family unpolluted by any foreign blood, especially German. But imagine his horror, when he was taken sick and the doctor announced to him that he had German Measles! The blow has proved to be too much for his delicate constitution and he is slowly sinking into unconsciousness. We bid him farewell. (*Of course, the foregoing is not really true, but we just had to fill some space*).

Philosophy

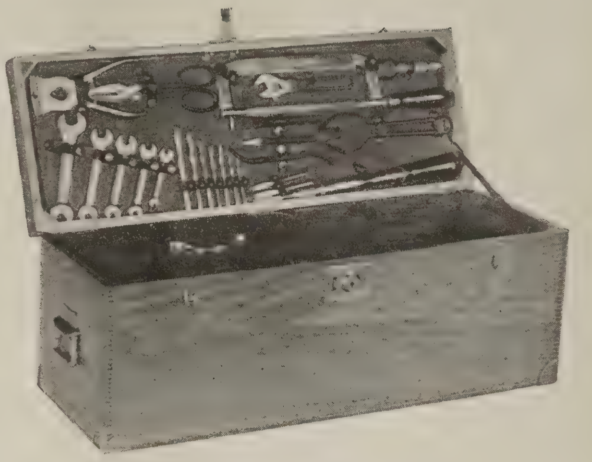
We offer the following to prospective aviators who fear injury, as a sort of balm for the mind.

Either you go up into the air or you don't. If you didn't go up there is no cause for worry. Now let us consider that you go up. Either your machine is a strong one or it is not. If it is there is no cause for worry. If it is not, you will either fall or you will not. If you do not fall, do not let the matter trouble you. If you do fall, you will either be injured or you will be safe. If you are safe, forget about it. Let us consider that you are injured. You will either die or get well. If you are going to get well you are foolish to worry. If you die you can't worry, so why worry in the first place? Und so weiter ad infinitum.

Reasonless Rhymes

Gustave had an aeroplane,
He flew it for the Kaiser
Until he tried to loop-the-loop,
He's crippled now—but waiser.
(Yes, we meant to spell it that way.)

LATEST WAR NEWS.
Having demolished the enemy's fortifications I am now seeking shelter from their aerial attack.



A Pilot's Necessity

THE accompanying illustrations show the compactness and completeness of the Cooper Aeronautical Tool Box. Complete with the assortment of tools shown on the lower diagram the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

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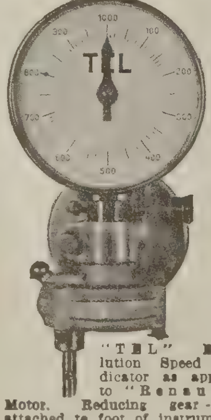

"TEL" Revolution Speed Indicator as applied to "Renault" Motor. Reducing gear-box attached to foot of instrument

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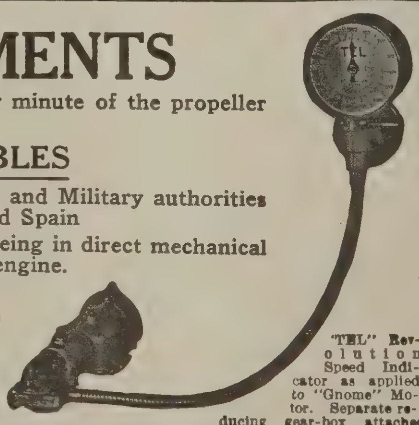
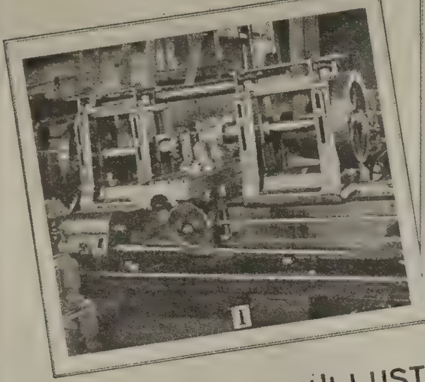
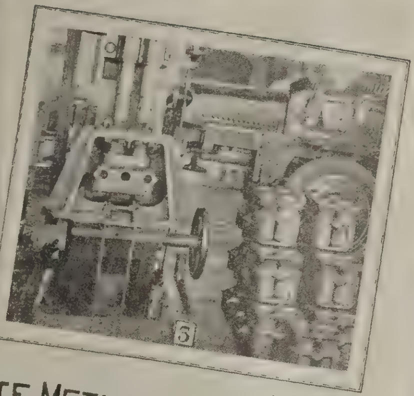


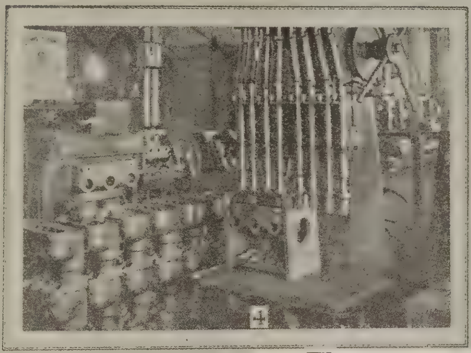
"TEL" Revolution Speed Indicator as applied to "Gnome" Motor. Separate reducing gear-box attached oil pump of motor.





A FEW ILLUSTRATIONS OF THE UP-TO-DATE METHODS
EMPLOYED IN THE MANUFACTURE
OF
THOMAS AEROMOTORS.

Thomas Thomas



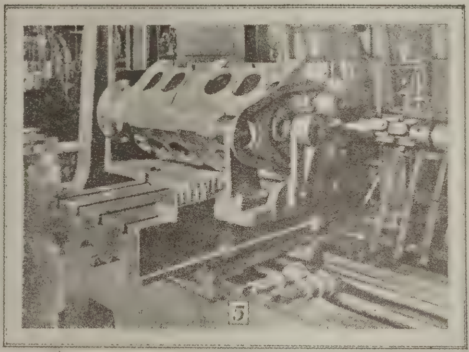
1 Milling cylinder top and foot at one operation on a heavy double spindle machine.

2 Drilling the holding down holes on a Bausch multiple spindle drill.

3 Boring cylinders on a heavy double spindle boring mill.

4 Boring the valve chambers on an eight spindle boring machine.

5 Crankcase set up for boring the crankshaft and camshaft tunnels.



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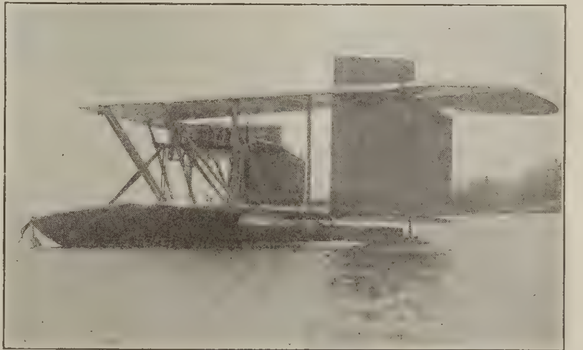
ANNOUNCEMENT

BURGESS FLYING BOAT



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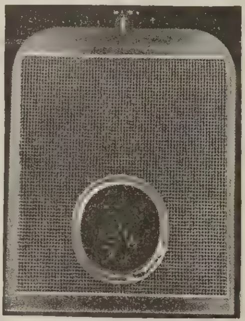

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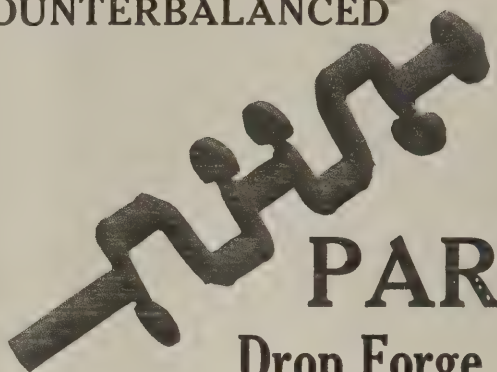

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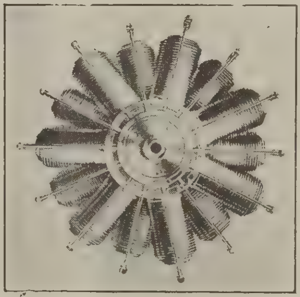

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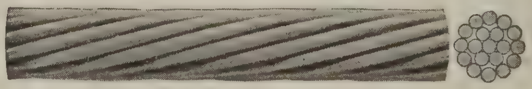

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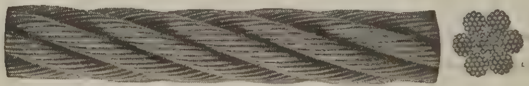

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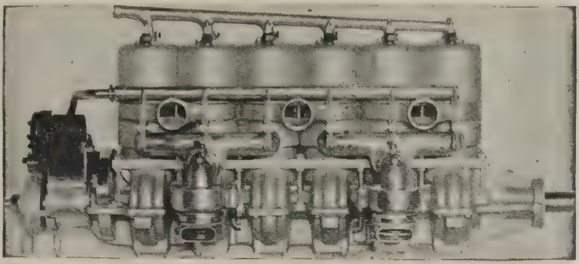

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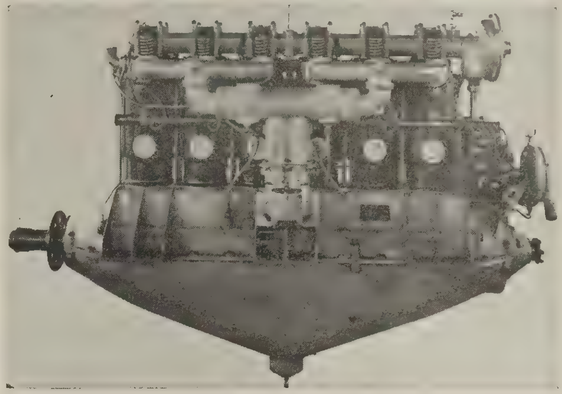
Hall-Scott Aviation Motors



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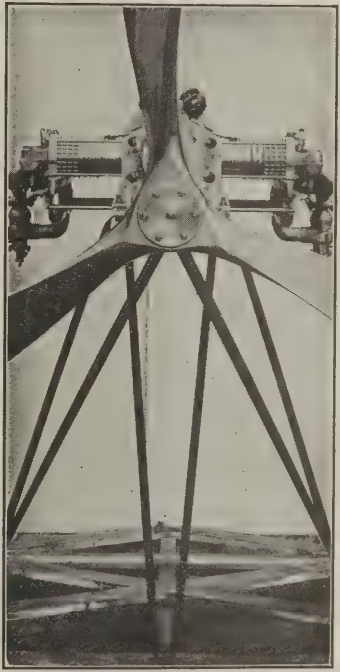

This photograph clearly indicates the small amount of head resistance of the entire power plant of the improved ASHMUSEN 12-cylinder, 105 H. P., self cooled aeronautical motor as mounted on one type of standard.

Our new modern manufacturing plant is now producing these motors and the 8-cylinder, 70 H. P. motors exclusively and regularly.

Ashmusen Manufacturing Co.
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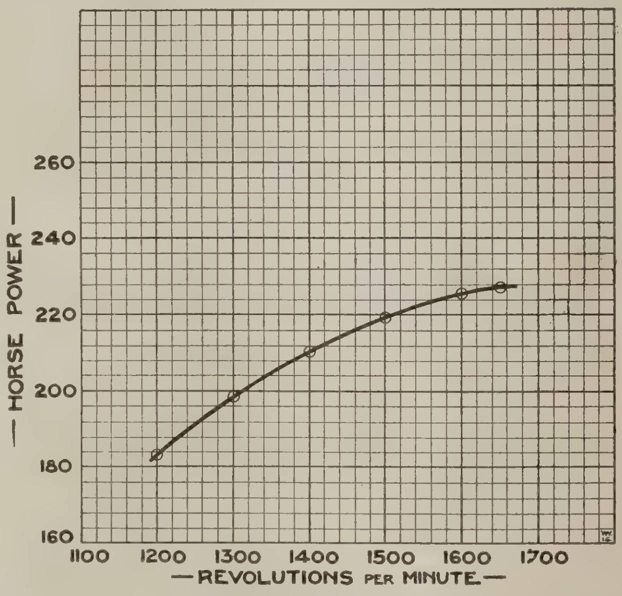
NOTICE

OWING to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed Horse Power	210.50
Minimum Observed Horse Power	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

CURTISS AEROPLANE & MOTOR CORPORATION

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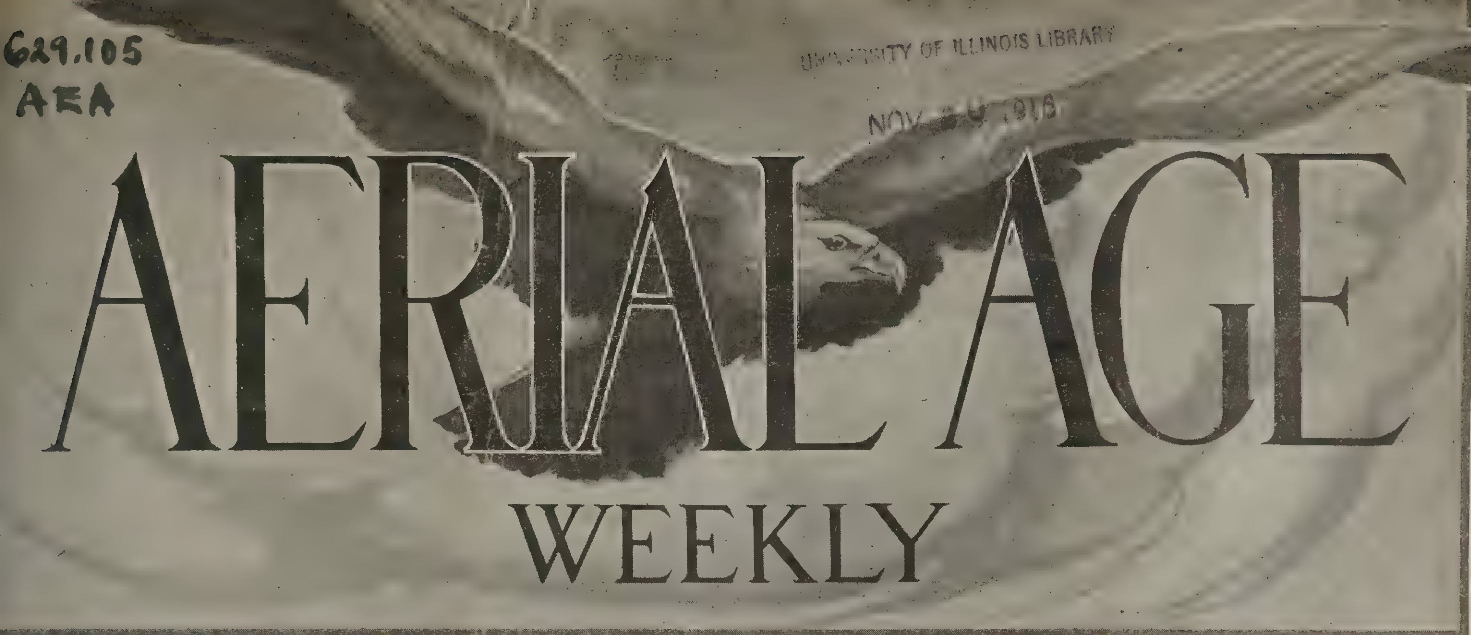

AERIAL AGE
WEEKLY

VOL. 4, No. 10 NOVEMBER 20, 1916 10 CENTS A COPY

The Aerial Requirements of Our Coast and Field Artillery

The Knox 300 H. P. Aero Engine Described

Curtiss Granted Hydroaeroplane Patents

Wright-Martin Aircraft Corp.

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Wright Flying Field, Inc.
General Aeronautic Company of America, Inc. (*Export Company*)

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New Brunswick, N. J. (Simplex Works)
Western flying field
Los Angeles, Cal.
Eastern flying field
Hempstead Plains, L. I.
Hydroaeroplane station
Port Washington, L. I.
Total men employed, 2362

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Hess-Bright

Not Controlled by Outsiders

TO correct misleading rumors and statements, The Hess-Bright Manufacturing Company makes the following announcement:

A group of bankers, including Frank A. Vanderlip, Philip W. Henry, Thatcher M. Brown, and Franklin B. Kirkbride, of New York, and Marcus Wallenberg, of Stockholm, have recently acquired from the American group of stockholders, a controlling interest in the shares of the Hess-Bright Manufacturing Company. This group of bankers owns also a substantial interest in the S. K. F. Ball Bearing Company of Hartford, Connecticut.

The two companies will be operated quite independently of each other. The former policy of the Hess-Bright Manufacturing Company will be continued except that its manufacturing facilities will be increased somewhat more rapidly to meet the constantly growing demand for its product. B. D. Gray, who retains his former stock holdings, will continue to manage the business as President. F. E. Bright retires from active participation in the Company's affairs, but remains identified with the Company as Chairman of the Board. Aside from these two changes, the organization remains as before.

THE DIRECTORS ARE:

F. E. Bright, Chairman.

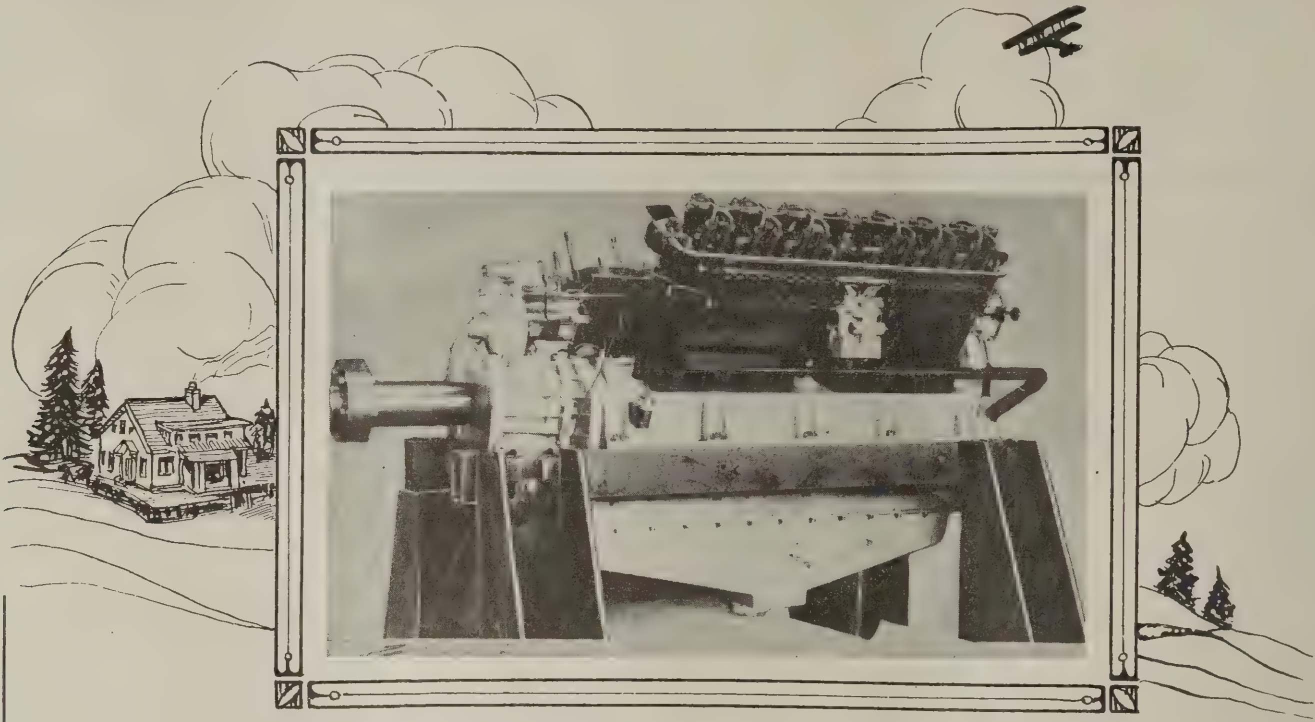
B. D. Gray, President of The Hess-Bright Manufacturing Company.

Willard Parker Butler, of New York City.

Arthur V. Morton, Vice President of the Pennsylvania Company for Insurance on Lives and Granting Annuities, of Philadelphia.

Paul von Gontard, Managing Director of the Deutsche Waffen- und Munitions Fabriken, Berlin, Germany.

Philadelphia, Nov. 14, 1916.



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300 Horse Power

Knox Aeronautic Engine

After months of experimenting, building and re-building, testing and re-testing; after subjecting the motor to the severest kind of dynamometer tests; after putting it through endurance runs of from two to eight hours under conditions many times more severe than could occur in actual service, the Knox aeronautic motor has stood up with a virile strength that nothing could break.

Accuracy is the keynote to every unit in its construction, and this, combined with the highest grade materials, represents the greatest possible power and dependability.

GENERAL SPECIFICATIONS

Twelve cylinders, "V" type; 4 3/4 inch bore by 7 inch stroke. Cylinders are of special aluminum alloy with cast iron liners 1/8 inch thick. Crankcase is of special aluminum alloy.

The motor complete, including electric starter, electric lighting, tachometer showing propeller speed, exhaust pipes, ignition apparatus, and provision for driving wireless apparatus, is 1400 pounds.

Complete data sheets of tests will be mailed on application.

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AERIAL AGE
WEEKLY

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VOL. IV New York, November 20, 1916 No. 10

127 KITE BALLOONS, 17 AERO SQUADRONS AND 6 DIRIGIBLES NEEDED FOR COAST AND FIELD ARTILLERY

THE fact that not one of the 43 field artillery batteries and the 73 forts in the six coast artillery districts has an aeroplane, observation balloon or dirigible is brought out in the report presented by Mr. Alan R. Hawley, President of the Aero Club of America, at the annual meeting of the Club November 13. This report, after giving the deplorable conditions in detail, points out that the field and coast artillery need 17 aero squadrons, 127 kite balloons and six dirigibles.

Important Reports from Authorities

The aeronautical authorities who presented reports included Rear Admiral Robert E. Peary, Chairman of the National Aerial Coast Patrol Commission; Alan R. Hawley, President of the Aero Club of America; Henry A. Wise Wood, Chairman of the Conference Committee on National Preparedness and President of the American Society of Aeronautical Engineers; Howard E. Coffin, Member of the Naval Consulting Board, who was recently appointed by President Wilson on the Council of National Defense; Henry Woodhouse, James A. Blair, Jr., Evert Jansen Wendell, Governors of the Club, Augustus Post, and others.

Able Officers of the Club Re-elected

The Club elections held at this meeting resulted in unanimously electing for another term the same administration which administered the affairs of the Club during the past two year. The officers elected for the fiscal year ending November 8th, 1917; are: President, Alan R. Hawley; 1st Vice President, Henry A. Wise Wood; 2nd Vice-President, Cortlandt F. Bishop; 3rd Vice President, Charles Jerome Edwards; 4th Vice President Godfrey L. Cabot; Treasurer, Charles Elliott Warren.

The Board of Governors will be composed as follows: Cortlandt F. Bishop, James A. Blair, Jr., Robert J. Collier, Howard E. Coffin, W. Redmond Cross, Charles Jerome Edwards, Brig. Gen. Robert K. Evans, U. S. A., Max C. Fleischmann, John Hays Hammond, Jr., Alan R. Hawley, Francis L. V. Hoppin, Henry B. Joy, Albert B. Lambert, William W. Miller, James E. Miller, George M. Myers, Harold F. McCormick, Rear Admiral Robert E. Peary, Raymond E. Price, Allen A. Ryan, Albert Santos-Dumont, Evert Jansen Wendell, Henry Woodhouse and Henry A Wise Wood.

Alexander Graham Bell Elected Honorary Member

Alexander Graham Bell, the inventor of the telephone, was elected honorary member for his contribution to the development of aeronautics which began in 1907, when he and Mrs. Bell organized the Aerial Experiment Association, of which Glenn H. Curtiss, J. D. McCurdy, and other pioneers were members and which started a series of valuable experimentation; also for his efforts in developing the plans for the employment of aeroplanes for mail-carrying purposes.

780 Members 676 Pilot Certificates Issued

The report of Francis L. V. Hoppin, Chairman of the Membership Committee, shows that the Aero Club of America has 780 members, 291 of which were admitted to membership this year.

The report of Mr. Alan R. Hawley, Chairman of the Contest Committee, shows that the Club has issued the Inter-National Aeronautic Federation pilot certificate to 676 aviators since 1909, 295 of which were issued during the past year.

Club's Recommendations for National Defense

It was resolved at the meeting to submit to President Wilson, the members of the House of Representatives and the Senate, the Council of National Defense and the Secretaries of War and Navy, the facts regarding:

(1) The necessity of providing 17 aero squadrons, 127 kite balloons and six dirigibles to supply the aeronautic auxiliaries needed for the 45 batteries of field artillery and the 73 forts in the six coast artillery districts which are now blind, as it were, and entirely exposed to the fire of the guns of an enemy, who would surely employ aircraft to direct the fire of its guns. Hundreds of millions of dollars are invested in the coast defenses and field artillery, which would be ineffective without the aerial auxiliary.

(2) The need of legislative provision to make aeronautics a part of the curriculum at West Point and Annapolis, so that every officer shall be taught the theory and practice of aeronautics.

(3) In view of the fact that the shortage of officers in the Army and Navy is such that there are not sufficient officers in the Army to officer the coast defenses and mobile Army, and in the Navy to officer more than part of the fleet in commission, and therefore, officers cannot be obtained for the air service without starving the other branches of the service, the Aero Club of America and its thirty constitutent Clubs, urge the Army and Navy Departments to fill the ranks of aerial reserve without delay, and foster the development of aeronautics in the Militia, so that there shall be made available as soon as possible at least 2,000 pilots for the Army and Navy.

Six other nations have each between 2,000 and 9,000 aviators and are increasing their aerial forces daily. The U. S. Army and Navy have less than 100 aviators between them, and, under the present National Defense Act, could not increase the number of aviators in the regular service to even the small total of 400 within five years. The above recommendations are, therefore, of vital importance.

(4) The value of the Aerial Coast Patrol as a means of training civilians in the use of aeroplanes for national defense, thereby creating a reserve of civilian aviators, trained in naval aeronautics, operating under the direction of the Navy Department, and establishing a chain of aeronautic stations along our coasts, under control of the Navy, to which civilians who wish to contribute their efforts to the upbuilding of the Naval Air Service can become connected, has been emphasized by the advent of the trans-atlantic submarine. It is urged that the $1,500,000 appropriation needed to establish the Aerial Coast Patrol be made available as soon as Congress meets in December.

(5) The need of establishing an aeronautic station at each of the thirteen naval districts and allowing one aeroplane and one kite balloon motor-ship for every eight battleships cannot be over-emphasized. The thirteen naval aeronautic stations proposed would become not only the bases for the naval air service, but also the centers in the chain of Aerial Coast Patrol stations, the commander of each of the thirteen naval districts having control of the Aerial Coast Patrol stations located in his local district. England alone has over one hundred aeronautic stations, Germany had over one hundred before the war.

(6) The last Congress authorized the employment of aeroplanes in the Coast Guard, for the purpose of saving life and

property along the coasts of the United States and at sea contiguous thereto and to assist in the national defense. But the necessary appropriations were not made available for carrying this plan into effect. It is urged that the appropriations be allowed as soon as Congress meets, so that this good work may proceed without delay.

(7). In endorsing the Council of National Defense and assuring the Council of the hearty co-operation of the Aero Club of America and its thirty constituent aero clubs and other organizations co-operating with the Club in the work of developing our aerial defenses, it is urged that whereas the Council, in accordance with the Act of Congress which created it, is to concentrate its efforts in co-ordinating the national resources and for "the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the nation," and whereas the problems of developing our aerial defenses can only be solved by the co-ordination of our aeronautic resources, the Council can render no more valuable service than to immediately take steps to bring about this co-ordination of aeronautic resources.

It was also resolved that the policy of the Club should be, as it has been in the past, to endorse and support whatever will add an aeroplane on an aviator to our aerial defenses and hasten the development of the aeronautic industry, thereby extending the sources of supply of aviators and aeronautic equipment for national defense.

Department of Aeronautics Urged

A MOST important resolution, which was unanimously and enthusiastically adopted was the following:

RESOLVED: That the Aero Club of America go on record as favoring the establishment of a Department of Aeronautics, as proposed by Rear Admiral Robert E. Peary, "A Department of Aeronautics separate from and independent of both the Army and the Navy, its head a member of the President's Cabinet, in full and undivided control of a comprehensive aerial coast defense, which our peculiar geographical position and extended coast line render imperative; of a system of aviation training schools located in each of the principal geographical divisions of the country; of the civil and commercial avenues of aeronautic activities."

The President of the Club was empowered to appoint a Committee of five, with himself as Chairman, to wait on the President of the United States for the purpose of advising him regarding the increasing importance of aeronautics, which has resulted in other countries establishing Departments of Aeronautics, and to urge the establishment of a Department of Aeronautics as proposed by Admiral Peary, which shall co-ordinate under one head all the aeronautic activities in the interests of national defense.

President Wilson and Congress Thanked For Support To Aeronautics

Other resolutions were adopted, as follows:

(1) A resolution expressing to President Wilson the Aero Club of America's appreciation of the cordial support which he gave to the Committees of the Club which during the past year presented to him the recommendations of the Club in connection with the upbuilding of our aerial defenses, and for his material approval and support of the plan to build a substantial air service.

(2) A resolution expressing the appreciation and gratification of the Aero Club of America to the Members of Congress and the Senate for the support and interest given to the aeronautic movement in Congress during the past session.

Support to Aviation Section Pledged

(3) A resolution expressing the Aero Club of America's appreciation and gratification to the Aviation Section of the Army for the encouraging manner in which it is taking up the work of building up the aeronautic branch of the Army, offering the Club's support to the Aviation Section in its work.

(4) A resolution to express to Victor Carlstrom our appreciation of his practical contribution to the art and science and to increasing public interest in aviation.

(5) A resolution expressing the Aero Club of America's appreciation and gratification to the officials of the Coast Guard and Post Office for their efforts to employ aeroplanes to extend the efficiency of their departments and offering the support of the Aero Club of America and constituent clubs in every way in which they can assist.

(6) A resolution thanking the press of the United States for the very substantial support which it has given to the aeronautic movement, with special appreciation to the New York *Times* and New York *World* for their far-reaching contributions.

(7) A resolution expressing appreciation of the patriotic efforts of the members of Volunteer Aerial Coast Patrol Unit No. 1, the members of Governor's Island Aerial Reserve, the twenty-four Harvard students and other patriotic civilians who learned to fly during the past year for the purpose of assisting in the upbuilding of our aerial defenses.

Appreciation of Industry's Patriotism

(8) A resolution of appreciation to the members of the aeronautic industry for the patriotic attitude shown them throughout the past years, when, though unsupported and unencouraged by the Government, they maintained the industry and provided this country with sources of supply of aeronautic equipment for national defense.

(9) A vote of thanks to the subscribers to the National Aeroplane Fund, whose contributions, as shown in the report of the work of the Fund, assisted so greatly in developing our aerial defenses.

(10) A resolution of appreciation to Messrs. Santos-Dumont, Henry A. Wise Wood, and Henry Woodhouse, who started the Pan-American movement many years ago, and fostered interest in it at their own expense and efforts.

(11) A resolution of appreciation to the National Advisory Committee on Aeronautics and to Mr. Howard E. Coffin and other members of the American Society of Aeronautic Engineers and Automobile Engineers, for starting to carry out the work of standardizing in aeronautics, offering the Aero Club of America's co-operation in their work.

(12) A resolution thanking the officers, the Board of Governors and the Chairmen of the various Committees of the Club for the excellent work they have done during the past year.

(13) A resolution thanking Messrs. Alan R. Hawley and Henry Woodhouse for their good work in convincing Congress of the need of increasing the aeronautical appropriations from the sum of $3,222,100 asked for by the Secretaries of War and the Navy to $17,886,600; and for their untiring efforts in fostering the development of aeronautics in the Army, Navy, Militia and civilian aeronautic resources and the aeronautic industry of the United States.

Martyrs of a New Science

Lieutenants C. K. Bronson and Luther Welsh, the two young naval officers who lost their life when testing an aeroplane bomb at Indian Head, Md., on November 7th, are two martyrs in a new science, just as J. Walter Wood Struthers was a martyr in the cause of preparedness.

In a world at war, with the exigencies of national preparedness, requiring that every effort be made to develop aerial preparedness, we appreciate more than ever the brave and patriotic attitude of men like these two officers, who face death to test new inventions which may contribute to the cause of national defense, and like Struthers, tried to contribute his efforts to the cause of aerial preparedness.

Lieut. Bronson's father, Edgar Beecher Bronson, the big game hunter and an old member of the Aero Club of America was one of the first people in the United States to make a balloon ascension and has taken aeroplane flights. His only comment, though his grief over the loss of his son was evident, was: "He died like a man."

A Song on Aviation

With a humming and a drumming, to announce that I am coming,
Up the long blue silent speedways of the universe I soar,
Saying "Howdy:" to Canopus, as I meet his rays of topaz,
Sweeping into virgin spaces where no man has been before.
Far below me flies the eagle, now a bird no longer regal,
Since his flight is short and puny as a wren's compared to mine;
For the spheres unfold before me, and I see the mystic glory
Of the infinite extending to the rim of things divine.
Oh, the wonder and the thunder of the wings that rend asunder
The eternal veils of silence that are wrapped around the stars!
Oh, the monstrous echoes falling through the distances apalling,
Where a host of nameless planets race their bright celestial cars!
Sing, ye wires and struts and braces! Let it ring across the spaces
Jupiter alone no longer rules the stellar empire vast.
Riding on my daring pinions, earth can share the air-dominions,
And the star-trust has been broken—smashed to smithereens at last.

MINNA IRVING, in the *N. Y Times.*

THE NEWS OF THE WEEK

Curtiss Marine Trophy Awarded to Victor Carlstrom

Victor Carlstrom, who recently made the Chicago-New York flight, has been awarded the Curtiss Marine Flying Trophy for 1916 and the $1,000 cash prize which goes with the Trophy.

The time for the competition for the Curtiss Marine Flying Trophy for 1916 expired on October 31, and the Contest Committee of the Aero Club of America passed upon the record which Mr. Carlstrom made on August 25th, when he flew 614 miles in 8 hours and 41 minutes.

According to the rules, the winner of the Curtiss Marine Trophy was to be the man who covered the greatest number of miles during ten hours of one day, and Mr. Carlstrom was the winner. In this flight he used a Curtiss J. N. seaplane equipped with two 100-h.p. motors. The course of the flight was a circuit taking in Newport News to Fisherman's Island, near Cape Charles, a distance of 51 miles.

Mr. Carlstrom in this flight represented the Aero Club of America.

The Curtiss Marine Flying Trophy is to be competed for by members of the thirty affiliated aero clubs, and if the trophy is won three times by the representatives of one club, it will become the property of that club.

Sturtevant Company Rushing Orders

The Sturtevant Aeroplane Company, of Jamaica Plain, Mass., is now hard at work on the 28 model S steel tractor biplanes ordered by the government. The company is also completing a few pursuit monoplanes, details of which are being withheld for the present by the War Department.

Papers at S. A. E. Winter Meeting

The technical papers to be presented at the one-day (Jan. 11) professional session of the Winter Meeting of the Society of Automobile Engineers will be truly representative of the enlarged activities of the Society. Some of the papers will, of course, relate to automobile engineering, but in addition subjects of interest to aeroplane, tractor and marine engineers will be presented. The Papers Committee, of which K. W. Zimmerschied is Chairman, is making the arrangements.

Captain Virginus E. Clark, U. S. A., will present a paper on aeroplanes with special relation to engines. This paper will deal also with the experiences of the Army aviators on the Mexican border and suggest improvements in construction. It is also hoped that a detailed description will be given of a foreign aero engine, which has recently been produced commercially in this country.

Carlstrom Uses Sperry Synchronized Drift Set

In making his record-breaking flight in the 200-horsepower Curtiss biplane, the "New York Times," Victor Carlstrom was ably assisted by using the Sperry synchronized drift set. This is a standard equipment that is specified for every United States Army aeroplane. With it Carlstrom was able not only to lay a true course but to follow it closely regardless of side winds.

Carlstrom is very warm in his appreciation of the synchronized drift set, by whose radium figured dial, readings can be made at night as well as in the day time. This instrument is remarkably light, compactly constructed and can be included in the equipment of any aeroplane or flying boat.

Carlstrom has said that he would not make another cross-country flight without using a syncronized drift set, which consists of a specially-constructed aeroplane magnetic compass, mechanically connected to a telescope having parallel lines in its field. The telescope is rotated by the pilot until its lines are parallel to the line of flight, which shifts the lubber's point of the compass to correct for the drift of the aeroplane.

Rev. Mr. Hall, 63, Makes Flight

The Rev. J. Cleveland Hall, rector of the Church of the Epiphany, of Danville, Va., and assistant chaplain of the Virginia division of the Traveler's Protective Association, recently did some high flying over Chesapeake Bay. He was taken up by an instructor of the Curtiss Aviation School at Newport News. The Norfolk (Va.) *Virginian-Pilot* says: "Mr. Hall showed such good nerve that the aviator took him up to an altitude of 2,500 feet and then treated him to some fancy thrills such as spirals and dips." The minister was delighted with his flying experience. Mr. Hall was told that he held the record for height and fancy flying for a man of his age—63 years young.

Hess-Bright Not Controlled by Outsiders

To correct misleading rumors and statements The Hess-Bright Manufacturing Company, makes the following announcement:

A group of bankers including Frank A. Vanderlip, Philip W. Henry, Thatcher M. Brown, and Franklin B. Kirkbride, of New York, and Marcus Wallenberg, of Stockholm, have recently acquired from the American group of stockholders, a controlling interest in the shares of The Hess-Bright Manufacturing Company. This group of bankers owns also a substantial interest in the S. K. F. Ball Bearing Company of Hartford, Connecticut.

The two companies will be operated quite independently of each other. The former policy of The Hess-Bright Manufacturing Company will be continued except that its manufacturing facilities will be increased somewhat more rapidly to meet the constantly growing demand for its product. B. D. Gray, who retains his former stock holdings, will continue to manage the business as President. F. E. Bright retires from active participation in the Company's affairs, but remains identified with the Company as Chairman of the Board. Aside from these two changes, the organization remains as before.

The directors are: F. E. Bright, chairman; B. D. Gray, president of The Hess-Bright Manufacturing Company; Willard Parker Butler, of New York City; Arthur V. Morton, vice-president of the Pennsylvania Company for Insurance on Lives and Granting Annuities, of Philadelphia; Paul von Gontard, managing director of the Deutsche Waffen-und Munitions Fabriken, Berlin, Germany.

Army and Navy Orders

Captain ARTHUR H. BRYANT, C. A., detached list, to Letterman General Hospital, Cal., for examination for detail in aviation section Signal Corps.

First Lieutenant CLAUD H. RHINEHART, 17th Cavalry, to Ft. Sam Houston for examination for detail aviation section Signal Corps.

Captain CARLETON G. CHAPMAN, aviation officer, Signal Corps, from Washington to Mineola, for temporary duty signal aviation school, thence to Washington.

First Lieutenant SYDNEY GRAVES, 16th Infantry, to Ft. Sam Houston for examination for detail in aviation section Signal Corps.

Major WILLIAM A. BURNSIDE, 26th Infantry, detailed to take field officer's course in aviation at Signal Corps aviation school, San Diego.

First Lieutenant HUBERT R. HARMON, C. A., attached aviation section, Signal Corps, as aviation student, to San Diego.

First Lieutenants HENRY ABBEY, JR., 10th Cavalry, and HENRY J. F. MILLER, Cavalry, detached officer's list, to Ft. Sam Houston for examination for detail in aviation section, Signal Corps.

First Lieutenant NORMAN W. PEEK, Infantry, attached to aviation section, Signal Corps, as an aviation student, Signal Corps aviation school, San Diego.

First Lieutenant EUGENE M. OWEN, 4th Cavalry, attached to aviation section, Signal Corps, as an aviation student, to Signal Corps aviation school, San Diego.

Two Aviators Die in Bomb Explosion

Lieutenants Luther Welsh and C. K. Bronson, U. S. N., were killed on November 8th by the explosion of an aeroplane bomb which they were testing during a flight over the Indian Head (Md.) naval proving grounds.

The aeroplane was at an altitude of about one thousand feet at the time of the accident. Officers observing the test said Lieutenant Welsh launched the bomb, which appeared to strike against some part of the machine as it fell. The aeroplane was broken in two by the explosion and fell into the Potomac River. The men apparently were blown to bits.

The Navy Department made public the following statement:

"Lieutenant Luther Welsh and Lieutenant C. K. Bronson were killed this afternoon by the explosion of an aeroplane bomb during experimental work in testing bombs for use against vessels.

"The bomb detonated immediately beneath the aeroplane. It was being launched by Lieutenant Welsh, and apparently struck some part of the aeroplane. It was seen to detonate, and the aeroplane broke in two and fell into the river.

"Hardly any trace of the aeroplane or passengers has been located yet.

"This occurred about twenty-five minutes to three o'clock this afternoon. The experiments were being conducted by Lieutenant Wilkinson, as representative of the Bureau of Ordnance."

Lieutenant Welsh was known as a brilliant junior officer. He was graduated fourth in his class at Annapolis and took a special course in ordnance at George Washington University. He was born in Kansas City, Mo., June 20, 1889, was appointed a midshipman in 1905 and was graduated with the class of 1909. In 1911 he was commissioned ensign and ordered to the battleship North Dakota. In December, 1911, he began his studies in ordnance. After his promotion to the grade of junior lieutenant in 1914 he was ordered to duty as aid on the staff of the commander of the third division of the Atlantic fleet. He had been on ordnance duty at Indian Head since March 18 last..

Lieutenant Bronson was serving as aviator during the ordnance tests. He was trained for aviation service on board the battleships Mississippi and North Carolina and at the aeronautic station, Pensacola, Fla. In March, 1914, he was promoted to the grade of junior lieutenant and designated as a naval aviator. Lieutenant Bronson was born in Bushnell, Ill., July 21, 1888, and was appointed a midshipman in 1906 from New York.

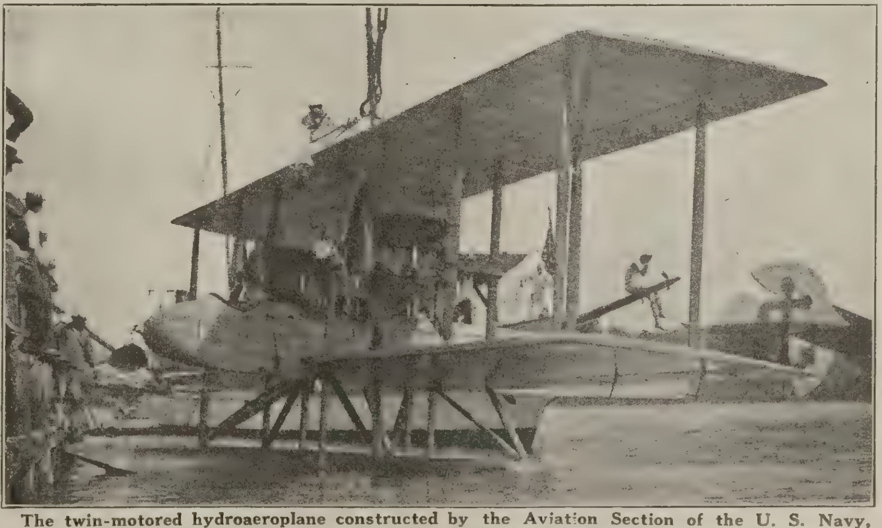
Thaw and Johnson Coming Back

Lieut. William Thaw and Chouteau C. Johnson of New York, two members of the American aviation squadron of the French army, have sailed for the United States.

They have a three weeks' furlough.

Lieut. Spencer Marries Miss Warfield

The marriage of Miss Wallis Warfield, daughter of Mrs. John Freeman Rasin, of Baltimore, Md., to Lieutenant E. Winfield Spencer, U. S. N., son of Mr. and Mrs. Winfield Spencer, of Chicago, took place on November 8 before an assemblage of society from several cities, in Christ Protestant Episcopal Church.



The twin-motored hydroaeroplane constructed by the Aviation Section of the U. S. Navy, under the direction of Constructor R. C. Richardson.

Sperry Flies Over New York City

On Monday night, November 6th, Lawrence Sperry created great excitement in New York City by flying over the lower part of Manhattan in a Curtiss biplane. The whirring of the motor awakened the people below to the fact that an aeroplane was pasing overhead.

The aeroplane could be seen distinctly from the wireless station of the New York Herald.

Griffith Aviation Field Abandoned?

According to the announcement of Van M. Griffith, the Griffith Park aviation field, at Los Angeles, will soon become a thing of the past. He said that the lease on the field has expired, and that it would not be renewed. The field was originally established through the efforts of Griffith and Prof. H. La V. Twining and the Aero Club of California.

Aviation Field at Waco

The aviation school for Waco, which was secured by the Chamber of Commerce and Young Men's Business League, was opened recently. For the purpose of giving the directors of the organizations, together with the public in general, an opportunity to inspect the workings of the plant and the type of aeroplanes that are to be used in teaching the art of flying, the school was made open for public inspection.

The building for the aviation school has just been completed, and is located at Thirty-fifth and Laska Streets. Two Curtiss machines have already been received and are ready for the initial flights.

CHICAGO NEWS

By Arthur E. Nealy

Tuesday evening, the seventh of November, Captain J. C. Morrow, of the U. S. Aviation Station, Chicago, Ill., held a meeting in the Federal Building for the purpose of informing applicants of the requirements necessary to become a student of the U. S. Aviation School. Three hundred and fifty Chicago aviation enthusiasts attended the meeting, both from the Aero Club of Illinois and from the Ashburn Flying Field contingent. Captain Morrow stated the several things necessary to be gone through prior to the examination itself, and expressed a hope that a sufficient number of applicants would be obtained and passed upon to make the central school the most successful in the country.

The requirements that stood out as the most important in the minds of his hearers were the following: Applicants must be over 21 years of age and under 30; they must weigh not over 190 pounds, possess the equivalent of a college education, and pass strict physical, mental and moral examinations.

The large amount of flying that the people of Chicago have seen at Ashburn Field by Lieutenant Christie of the Signal Corps and civilian flying instructor McCauley was doubtless a contributing reason for the exceedingly large number of applicants at the meeting. Charles Dickinson president of the Aero Club of Illinois, Jimmie Ward, Roth, Partridge, Kellar and other experienced flying men were present.

Personal Pars

E. C. Christy, the Hugo, Okla. aviator, lost his life October 26, when he fell while making an exhibition flight.

According to the Atlanta Constitution, Monte Rolfe is shortly to open a school at Atlanta for the winter season.

"Dutch" Robinson, of Washington, Penna., made flights at the New Orleans fair last week.

Miss Katherine Stinson flew at Clinton, Iowa, last week.

President Boeing Advocates Forest Patrol

Lumbermen of three States and one foreign country gathered in Portland, Oregon, on October 26 for the two-day session of the Western Forestry and Conservation Association and heard of and considered a new use for the aeroplane, that of sighting and reporting forest fires.

A paper from W. E. Boeing, president of the Northwest Aero Club of Seattle, which, in the absence of Mr. Boeing, was read by E. M. Gott, declared that the use of aeroplanes for spotting forest fires is wholly practicable.

Representatives of lumber interests in the United tSates and Canada attended the conference.

In urging the aeroplane as a forest fire fighting instrument, Mr. Boeing said a plane 1500 feet high could spot a fire 60 miles away and do work over a tremendously wide territory in a day. He pointed out that by training an aeroplane patrol the nation would also develop airplane experts whose services could be relied upon in an emergency.

Sandusky May Have Aviation School

Congressman Overmyer is using his influence, according to the Sandusky *Register*, to interest the Aviation Section of the War Department in locating a training school on Sandusky Bay.

Sandusky Bay has the advantage of size and shelter. It is also pointed out that this part of Ohio, for some reason or other, usually feels the effects of storms less than other sections.

Aviation School at Jacksonville

F. C. G. Eden, representing Mr. Earl Dodge, is now in Jacksonville, Florida, selecting a site for the aviation school at which Mr. Dodge will train the sixteen college students, the plan for which was announced recently by the Aero Club of America, through the columns of *Aerial Age*. It is expected that training will begin about the end of November.

Essington School Closes for Season

The Philadelphia School of Aviation, which is situated at Essington, Pa. (about 45 minutes by trolley from the centre of the city), is closing after a successful season.

The school was started by Mr. Robert Glendinning in the interest of aerial preparedness. It received its corporate charter February 16, 1916, and the old Lazaretto property, owned by the city, was leased to it for a term of 10 years. Although labor was difficult to obtain, two large steel hangars were at once erected (large enough to accommodate 12 machines), a marine railway laid from the level of the hangars to the low water mark of the tide (which has a fall of about six feet) and shops and plane rooms, etc., installed as necessity demanded.

The platform which is used for launching and landing machines is 45 feet wide by 25 feet deep, and is run on the marine railway by cable and electric motor from the level of the hangars to low water of the river, where it is nearly submerged, and makes it possible to handle machines with perfect facility under the disadvantage of a four or five-mile-an-hour current in the river, which has to be met in the rise and fall of the tide.

The school was opened on the 15th of May, with an enrollment of seven students, which number was gradually increased as the season progressed to a total of 32. Out of this number 17 students have completed their course up to this date, 4 have taken out pilot's licenses and 6 more are competent and prepared to take the test the first day conditions are favorable.

Mr. Walter E. Johnson, the well-known aviator, is head instructor, and has had complete charge of the field, employing 4 expert mechanicians, who have been able to keep the machines constantly in good condition and have permitted him to take advantage of every minute of the time when weather conditions were right. He has had flying days where he has been in the the air as much as 6½ hours, and several weeks that have shown over 18 hours of instruction.

The school has constantly available 2 A. H. hydroaeroplanes and one school boat, with one extra motor in reserve, all being Curtiss OXX2 type, and being interchangeable has made it possible to continue flying very steadily.

Up to this date, 7th of October, the school has actually delivered to students 10,525 minutes, which does not include about 500 minutes additional that have been given on Sundays in passenger flights, as students were not taught on Sundays. This will average, excluding Sundays and holidays, approximately 90 minutes a day instruction work, which, considering the great number of days when weather conditions did not allow the machines out of the hangars, is very satisfactory.

The school opened every morning at daylight, giving business men and clerks employed in offices an opportunity of instruction before their business day began, and in the afternoons we continued instructions until it was too dark to see, which made it convenient for students who could not be present in the morning.

A small house was utilized on the property for boarding students who care to remain on the field, and next year facilities will be increased to accommodate a considerable number in case demands require it.

The price charged for instructions has been $400 a course, and the outlay of money for establish the school has been entirely borne by the gentlemen who have associated themselves in this enterprise.

It is at least a satisfaction to know that, barring the total destruction of a machine through the carelessness of one of the students who was flying alone, who was not himself hurt in any way and which machine was promptly replaced by a new one, that there has been no accident of any kind to any one connected with the school.

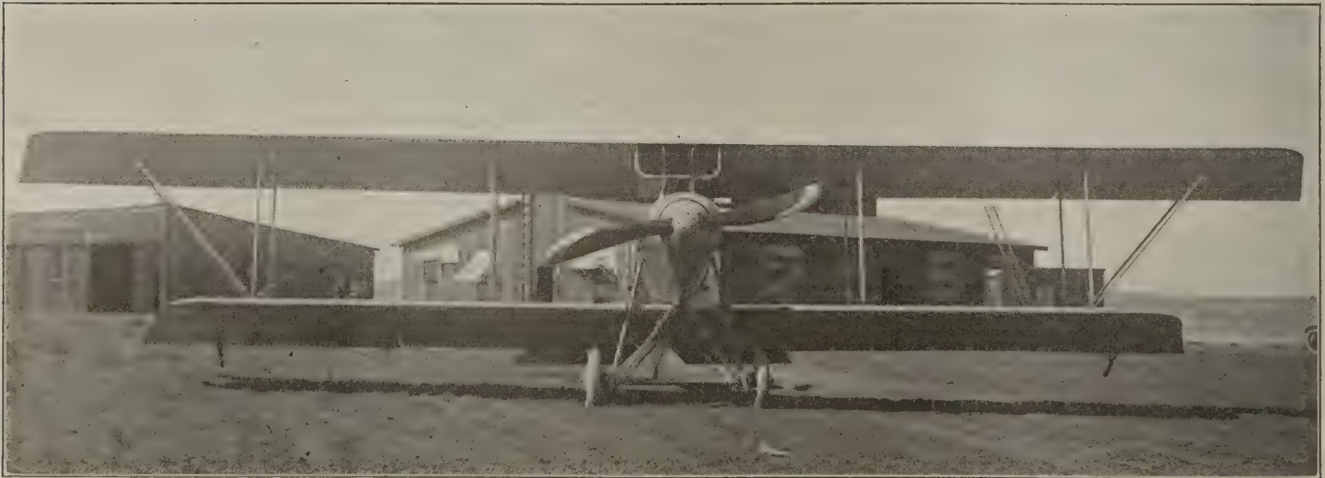
Throught the generosity of Mr. George C. Thomas, Jr., the vice-president, who made such a successful flight to Atlantic City some time ago with Mr. Johnson, the school was able to continue the season without calling for financial assistance from any of the stockholders or members of the Board.

The students who have completed the course and become Licensed Aviators are: Messrs. S. H. Noyes, J. W. Geary, Jr., E. B. Eckert and Dudley Norton.

Those who have finished the course, received their diplomas and will take their F. A. I. certificates at the earliest opportunity are:

Mrs. Paul D. Mills, Messrs. George C. Thomas, Jr., G. L. Larrabee, Clark Thomson, W. J. Schaffer, J. B. Stetson, Jr., A. J. A. Devereaux, G. Henry Stetson, E. B. Simonin, J. C. Biddle, G. A. Huhn, 3d, U. A. Masuda, Daniel Buckley, F. H. Maguire and E. F. Beers.

Those who are still under instruction are: Mrs. D. H. Ireland, Messrs. J. J. McNally, Edward Brous, W. E. Carter, F. A. Dickman, J. N. Pugh, Jr., E. V. Dougherty, J. D. Este, Caleb Fox, Jr., R. H. McGowan, Howard Graham, Jr., and Eaton Cromwell.



The Model S all-steel Sturtevant tractor biplane of the type being constructed for the U. S. Army.

Leo Stevens Appointed As Army Instructor

Mr. A. Leo Stevens, the veteran aeronaut and manufacturer of lighter-than-air craft, has been oppointed Army Instructor in the operation of dirigibles, kite balloons and spherical balloons.

Mr. Stevens' appointment was authorized by the Civil Service Commission, and Mr. Stevens is to report to the office of the Chief Signal Officer of the Army at Washington on December 1st, and remain there for a time, after which he will proceed to inspect the factories of the three firms which have received the Army's preliminary orders for three kite balloons and two spherical balloons. After inspecting these factories and arranging for the general supervision of the manufacturing of these balloons for the Army, he will proceed to Omaha, Neb., where there is being established the first lighter-than-air aircraft station, with Major Charles de F. Chandler in charge.

Mr. Stevens has had twenty-five years of experience in manufacturing and operating balloons and dirigibles, during which time he manufactured about 1,500 balloons of different kinds and made about 2,000 ascensions. He is considered to be a thorough expert in that line, and the Aero Club of America officials and other aeronautical authorities are elated over his appointment, and they feel that Captain Chandler and Mr. Stevens, both being thorough and practical experts in aerostatics, there can be expected quick and substantial developments in that branch of the service.

In joining the Army, Mr. Stevens gives up his factory and all private interests, and will hereafter confine himself entirely to the Army work.

Wright-Martin Aircraft Stock is Quickly Sold

All the common stock and most of the preferred stock of the Wright-Martin Aircraft Corporation has been sold and an announcement that the syndicate has been terminated may be made this week. That the underwriting has been highly successful is evident from the short time required to place the shares. This has been due largely to the agreement by the syndicate to dispose of the preferred, as well as the common shares, at figures it believed would be attractive to investors.

A large percentage of the shares has gone to interests who have confidence in the rapid growth of the Wright-Martin Co.

It is understood that negotiations are underway, which if successfully concluded, will add contracts valued at millions of dollars to the unfilled orders of the Wright-Martin Co.

The preferred stock of the Wright-Martin Aircraft Co. will probably go on a quarterly dividend basis of 1¾% before the close of the current year. There are 50,000 shares of 7% cumulative preferred stock, par value $100. Of the 500,000 shares of common stock with no par value, 100,000 shares have been reserved to convert 50,000 shares of preferred stock at the ratio of two shares of common for one share of preferred. There will also be reserved for future corporate purposes 72,800 shares of common.

Of the $5,000,000 preferred stock the underwriting agreement provided that $4,000,000 be disposed of for cash requirements.

Earnings of the Simplex Automobile Co., which is a constituent of the Wright-Martin Co., will more than take care of the preferred dividend.

President Edward M. Hagar, of the Wright-Martin Co., in a recent statement gave the fixed assets of the company as $1,800,000 and working capital $2,200,000, a total of $4,000,000.

Aviator Struthers Dies of Injuries

John Walter Wood Struthers, son of Robert Struthers, an architect, of 10 East Eighty-sixth street, died here yesterday from injuries received when he fell 800 feet with his aeroplane at the Governors Island Aviation School on Sept. 8. With Charles D. Wiman of Moline, Ill., he was spiraling when the machine developed tail spinning and dropped to the parade ground before control could be regained. Both of the student aviator's legs were broken and he had suffered internal injuries. He was in his thirty-first year, and had been flying since last May. Both he and Mr. Wiman had obtained their F. A. I. licenses and were to have taken the tests for the military aviator's license.

Mr. Struthers was in business with his brothers, Robert, Jr., and Wood Struthers, as a stockbroker at 43 Exchange Place.

Chicagoans Plan Aero Mail Service

A group of Chicago aviation experts, spurred on by the aeroplane flight which Victor Carlstrom made from Chicago to New York for The New York Times in 8 hours 28 minutes 30 seconds actual flying time, are organizing a company to establish regular aeroplane mail routes between Chicago and Detroit and Chicago and New York. The Detroit route would be made without a stop; the New York route would include from one to three stops for fuel, so that the carrying capacity which Carlstrom used to take 1,500 pounds of gasoline could be devoted to mail.

Glenn Muffly, who was first in the bicycle business and later engaged in the manufacture of automobile and is now manufacturing a rotary aeroplane motor in Chicago, is promoting the enterprise, and the machines for the service will be designed by Walter L. Brock, who in 1914 won the British Aerial Derby, the race from London to Manchester and back, and the cross-Channel race from London to Paris and return. The organizers do not expect to get started for eighteen months.

"The public has paid for every faster means of transportation and communication so far invented," Mr. Muffly wrote in a letter the The Times, "and there can be no two ways about this—aeroplane mail and express service is coming. Passenger business will follow as soon as the public is educated to the fact that the modern aeroplane is safe. Our plan is to operate a daily—or rather nightly—air service between Chicago and New York, carrying mail and later passengers. Machines will leave Chicago and New York each evening after business hours and arrive at their destination early the next morning. Carlstrom made the trip in 8 hours 28½ minutes flying time, and we are figuring on ten hours, allowing for the taking on of fuel. Letters mailed at the close of business in either city will reach the other end of the line in time for the first delivery in the morning."

Lieut. Jones Puts Sturtevant Plane Through Severe Tests

Lieut. Byron Q. Jones, America's greatest trick military aeroplanist, gave a wonderful exhibition of flying at the North Island military aerodrome on October 27.

Piloting one of the new 135-horsepower Sturtevant all steel battleplanes Lieut. Jones ascended to 3,000 ft. and then suddenly went into a terrific nose dive. After a fall of 1,500 feet he turned the steel plane upward, rose to an altitude of about 2,500 feet, stalled and then went into a tail dive. He performed this unusually hazardous aerial feat four times.

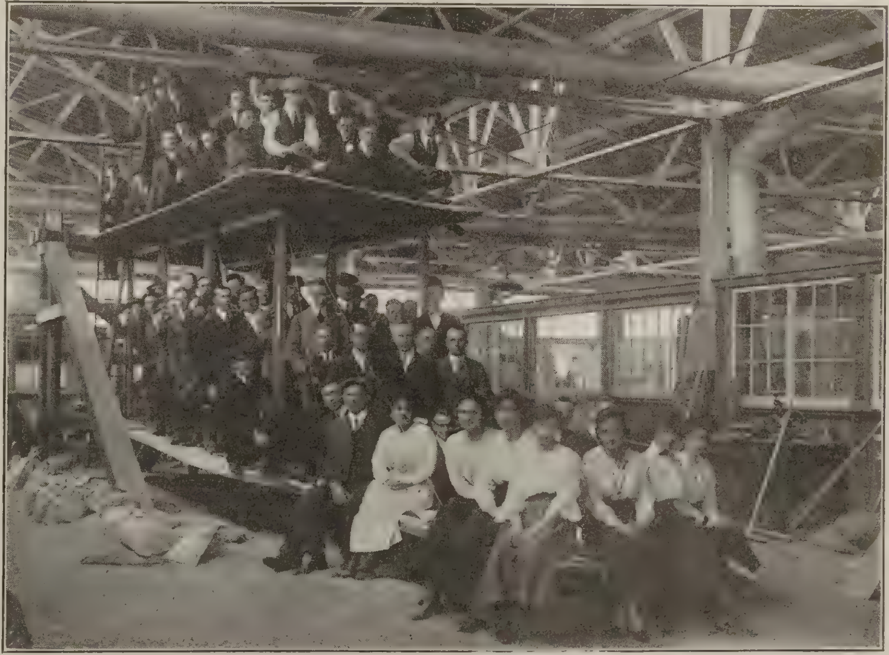
Frank H. Trego the designer of the 300 H.P. Knox Aeronautic Engine described in this issue

Before the daring young military aviator had completed his morning's test of the new battleplane he had turned the machine into every conceivable aerial evolution.

Military aviators admit that after Lieut. Jones has placed his stamp of approval on a new aeroplane it is as free from structural defects as the North Pole is of flies.

Election Results Flashed from Aeroplane

If the plans of the *Pioneer Press* and *Dispatch*, of St. Paul, Minn., were carried through on election eve, Laddie Laird flew over that city and by signal transmitted the election results to the citizens below. The idea is a novel one, and the *Dispatch* is to be congratulated for its enterprise.



LOADED TO HALF ITS CAPACITY

The Curtiss H-12 flying boat wing, after carrying 20,000 pounds without injury in an official sand load test, was filled with "passengers" to show its safety. The 60 people and planking together weighed nearly 10,000 pounds. The wing was supported only at its root by the massive horizontal timbers shown in the photograph. The maximum sand load was nearly six time its normal air load in flight.

The wings were of course inverted to receive the load as would be the case in flight. The span of these panels is 40 feet and the total wing span of the assembled craft is 92′ 8½″.

Among those shown as "passengers" are several Governmental inspectors, including Chief Inspector Geo. Sykes for the British Admiralty and official representatives for the U. S. Army and Navy Lieuts. J. V. Costello and W. Capehart. Dr. F. Zahm, in charge of the test, is head of the Curtiss Company Research Department and also shown in the photograph are Chief Inspector Charles M. Manley and Chief Motor Engineer Charles B. Kirkham of the Curtiss staff.

THE CURTISS HYDROAEROPLANE PATENT

Glenn H. Curtiss has recently been granted important patents covering hydroaeroplanes, which are hereafter presented complete.

To all whom it may concern:

Be it known that I, Glenn H. Curtiss, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Hydroaeroplanes, of which the following is a specification.

My invention relates to improvements in heavier-than-air flying machines, and has reference particularly to a machine adapted to alight on the water and rise therefrom by its own power.

The invention is directed to the longitudinal balance and control of the machine.

This application is a division of my co-pending application S. No. 645,340 filed August 22, 1911.

My invention will be set forth in the claims.

In the drawings which show the preferred form of my invention, Figure 1 is a perspective view from the front, parts having been omitted in order not to complicate the drawings; Fig. 2 is a side elevation; Figs. 3, 4, and 14 are details of the folding wheel construction; Fig. 5 is a top plan view of the machine; Fig. 6 a front view showing the arrangement of the mechanism for operating the ailerons; Figs. 7 and 8 are rear and side elevations of a socket; Fig. 9 is a front elevation of a portion of the superposed surfaces; Fig. 10 a plan view of one of the panels; Fig. 11 a front elevation of a machine having three superposed surfaces; Fig. 12 is a sectional detail of Fig. 10 taken on the line X—X, and Figs. 13-16 are enlarged details.

It is desirable that provision may be made by which the machine may land and float on the water and be driven forward by its own power in contact with the water, at a speed sufficient to cause the lift of the air to be greater than the weight of the whole machine, in order that the machine may rise out of the water and fly in the air. In the drawings I have shown an aeroplane or heavier-than-air machine provided with floating means to support the same on the water, and other constructions by which this result may be accomplished. The aeroplane proper is substantially the ordinary Curtiss machine which is now well known. It comprises an aeroplane surface sufficient to support the whole machine in the air and which is preferably split up into two superposed areas or surfaces 1 and 2 connected by spacing posts 3 and 4. These aeroplane surfaces define the region of aeroplane lift, and in them as in all cambered or curved aeroplane surfaces the region of the resultant center of lift is located approximately one-third of the chord length from the leading edge.

5 is a front substantially-horizontal rudder pivoted at 6 to the frame and rockable on its pivot by a manually movable device under the control of the operator, such as a lever 7 located in front of the operator's seat and pivoted at 8 to rock back and forth. 9 is a connecting bar pivoted at its ends to the elevating plane 5 and to the lower end of the said post 7.

10 and 11 are fixed horizontal surfaces at the rear, and 12, 13 are substantially horizontal elevating rudders pivoted to the fixed surfaces at 14.

15 is a vertical rudder pivoted to the fixed surface.

16, 17 is the bed for the engine 18. This engine may be the well-known eight-cylinder 50-horsepower four-cycle Curtiss engine, the cylinders being arranged in **V** position with radiator 19, tail shaft 20, and propeller 21 having a radius of 3½ feet and pitch of 6 feet rotating at about 1,200 revolutions per minute.

22 and 23 are substantially flat ailerons located between the surfaces 1 and 2 and are preferably pivoted to the rear posts 4, 4. These ailerons may be thrown in opposite directions by the operator by means which will be hereafter described and which are shown in Fig. 6, in order to restore the equilibrium of the machine in flight through the air.

The elevating rudders 5, 12 and 13 serve to direct the course of the machine up or down as desired, and the means by which they may be operated will be more particularly described hereafter.

Carried below the aeroplane surface 2 and fixed thereto by braces 24, 25, 26 is a floating means or base adapted to support the machine on the water. In the preferred form of my invention shown in the drawings this consists of a single watertight boat 27, one foot deep, two feet wide, and 16 feet long, flat on top and bottom and upwardly inclined at its forward under-surface 28 to form a transversely broad landing prow and downwardly inclined at its rear upper surface 29 to form in intersection with the bottom a transverse terminal edge, extending all the way across the boat. The surface 28 and the flat bottom are hydroplaning surfaces and both of them terminate laterally in abruptly turned chine edges. When the machine is at rest on the water the boat or base is submerged to substantially the water line indicated by the dotted line 30, and preferably extends somewhat forward of th eaeroplane proper and to the rear of the propeller 21 and also to the rear of the center of gravity of the machine.

It will be observed that the front or nose of the base is projected a greater distance in front of the aeroplane wings than is the rear terminus to the rear thereof. Thus obviously the major portion of the under hydro-surface lies in advance of the region of aeroplane lift. It will also be obvious that when the machine is at speed on the water the action of the surface of the inclined prow and flat bottom lifts the boat to the top of the water. Furthermore that in accordance with the laws of the hydroplane the region of the center of hydroplane lift lies nearer to the front edge of the surface than to the rear edge, in the usual case one-third its length from the leading edge. The projection of the boat forward of the wings as shown places its central portion opposite the region of the the central portion opposite the region of the center of aeroplane lift, and therefore its own center of lift in advance thereof.

I prefer to divide the floating means into separate compartments by transverse partitions 31 to prevent any water which may leak in from flowing back and forth in the boat.

In order to prevent either side of the planes from coming in contact with the water during travel through the water, I have provided at each side thereof devices acted on by the rush of water at positive angles of incidence in order to give a lift to either side which be depressed. These are preferably upwardly inclined devices extending slightly into the water when the machine is at rest, and which when the machine is at full speed barely touch the water, and in the embodiment shown are narrow blades 39 and 40 of flexible wood which, in traveling over the water, stand in the position shown in Fig. 1. If either side of the machine tips downward, the blade on that side touches the water and through the lift exerted by the rush of water straightens up the machine to substantial equilibrium. This operation in the embodiment shown takes place without any necessary action on the part of the operator, and therefore constitutes an automatic stabilizing means. The floats 32 and 33 are preferably pivoted at 34 and 35 to the braces 36, 37 and 38, 38′ are springs normally tending to hold the floats horizontal as shown in Fig. 1. In order that the operator may, if he desires vary the inclination of the floats and blades, I have provided a lever 42 connected to a wire 43 leading to each float, so that by movement of said lever from the position shown in Fig. 2 to that shown in Fig. 1, the floats, and with them the blades, may be inclined upward. Movement of the lever in the reverse direction allows the floats and blades to return to the horizontal position shown in Fig. 2 where they will exert slight head resistance to the rush of air. When the machine is at rest on the water, the floats may be allowed to take the horizontal position and prevent either side of the machine from dipping into the water. When the machine is started, the operator may throw his lever to incline the floats and blades, as shown in Fig. 1, and they will then act as an automatic stabilizing means. When the machine gets into the air the operator causes them to return to the horizontal position.

The inclined portion 28 of the boat is one form of a hydro-surface which is adapted to first strike the water as the machine descends and serves to tilt the front of the machine upwardly as it alights on the water, in order that the sudden resistances offered by the water may not cause the machine to dive.

45 and 46 are wheels constituting the preferred form of means for supporting the machine in travel in contact with the earth, if the machine is desired to run over the earth also. They are hung from the machine and project slightly below the lower surface of the boat, as indicated in Fig. 2. In order that they may exert less resistance when the machine is moving through the water, I have provided means under the control of the operator for raising the wheels out of the water when the machine is floating, and for depressing the same at will. In the preferred construction, 47 is a brace pivoted at 48 to the frame of the machine, and 49 is another brace pivoted to a short arm 52. A locking device shown in Figs. 3 and 4 in detail operates to hold the wheels in their depressed position shown in Fig. 1. As shown in Figs 3 and 4 and 14 the wheel is pivoted to the **U**-shaped frame 52 having projections 53 pivoted to the **U**-shaped end 54 of the brace 49. Bent arms 55 fixed to the frame 52 carry pivoted to them at 56 a locking detent 57, which has a catch-nose 58 engaging a bar 59 on the **U**-shaped frame 54. 60 is a spring normally holding the latch in the position shown in Fig. 4

The preferred mechanism for raising the wheels comprises a slidable rack bar 105 (see Figs. 13 and 14) engaged by a spring-pressed detent 106. 62 is a wire connected to the bar and running to the axle of the wheel, being led over suitable pulleys such as 61. 107 is a foot lever pivoted to the boat at 108 and carrying a spring dog 109, 110 is a spring to draw lever 107 backward. As the foot lever is reciprocated it forces the bar 105 downwardly, being held by detent 106 at each reciprocation, drawing on wire 62 and collapsing the frame 47, 49, 52 to the raised position shown in Fig. 14. The holding latch 106 may be tripped by a wire 111 and handle 112 adjacent to the operator's seat. In order to release lock 57 a wire 113 runs therefore to a pulley 114 loose on wire 62. This latter is slack when the wheels are down and locked, and as the slack is taken up it draws on wire 113, unlocking latch 57 just before wire 62 becomes taut. Of course the other wheel is provided with the same construction, the wires 62 of both wheels being connected to rack bar 105. Releasing the detent 106 before the machine comes out of the water allows the weight of the parts and the resistance offered by the water to throw the wheels back to the locked position shown in Figs. 1 and 4. The machine may then travel out of the water onto the land and over the same without the resistance which would be exerted by the boat 27 if in contact with the earth.

The elevating rudders 5, 12 and 13 are pivoted on transverse axes 6 and 14. Each of the rear rudders carries a post 63 extending above and below it, and from the upper end of each post a wire 64 leads to the lever 7 below its pivot, and from the lower end of each post 63 a wire 65 leads to the lever 7 above its pivot. Consequently when the lever 7 is pulled backward toward the operator, the connecting bar 9 causes the elevating rudder 5 to be presented to the wind at a positive angle of incidence and both rudders 12 and 13 to be tilted up to a negative angle of incidence. Consequently the action of the air on the rudder 5 tends to elevate the front of the machine, and the action of the air on the rudder 12 and 13 tends to depress the rear of the machine. Obviously movement of lever 7 in the opposite direction has the contrary effect. The rudders 12 and 13 are preferably cut away as shown in Fig. 5, and pivoted between them and to the horizontal fixed surface is a vertical rudder 15 which swings between the rudders 12 and 13. The vertical rudder may be operated from a steering wheel 66 mounted on lever 7 and connected to the vertical rudder by tiller rops 67, passing up through the hollow lever 7, arm 121 and around said wheel 66 as shown in Fig. 15.

The fixed surfaces 10 and 11 are substantially **V**-shaped but joined together to provide a fixed pivot for the vertical rudder and are fixed at their rear and immovably held at their apexes by the connecting struts 68 and 69. This construction prevents the "whipping" which migh occur if the **V**-shaped space between them were not provided.

The ailerons 22, 23 are preferably located substantially midway between the surfaces 1 and 2, and therefore are not so much affected by the deflection of the air currents caused by the impingement of the air on said surfaces 1 and 2, as said ailerons would be if they were hung directly to the rear edge of said surface. In the present embodiment I have shown them as pivoted to the rear posts, but this location is not essential, although such location is preferable as the wedging effect of the air is less at this position than would be the case if they were moved forward and pivoted to the front posts. I, however, do not desire to be limited to either such location of the ailerons. In order to provide means under the control of the operator for throwing these ailerons to opposite angles of incidence, I have provided connections therefrom by which the operator may tilt them in either direction, and preferably simultaneously in opposite directions. This in the embodiment shown comprises a laterally movable device, such as a shoulder frame 70, pivoted to the seat 71 by connecting bars 115, 116, 117 by which the frame may be moved from side to side, and carrying pivoted to it a rocking arm 72 with wires or ropes 73, 74 and 75, 76, said wires being attached to the projections or posts 77, 78 on the ailerons. It will be obvious that moving the shouder frame in either lateral direction will tilt the ailerons in opposite directions. The ailerons, as well as the rear rudders 12 and 13, are stiffened by wire running from each end of the posts or projections thereon to the corners of said surfaces.

In order to allow the control mechanism which operates the ailerons and vertical and horizontal rudders to be shifted to or from a passenger I have provided a construction by which this may be done instantaneously when in flight. In the preferred construction illustrated the passenger is provided with a seat 118 and laterally movable shoulder frame 119 similar to that on seat 71, but normally unconnected to frame 70. In order to connect the frame 119 to the aileron wires so that they may be operated from frame 119 I have provided a latch 120 which may be snapped over frame 70 as shown in dotted lines. This may be done almost instantaneously, and the passenger may then operate the ailerons. In order to pass the control for the vertical and horizontal rudder to the passenger I prefer to rotatably mount the steering wheel 66 within a fork 66 on arm 121 pivoted to lever 7 at 122 so that the wheel may be passed across from one seat to the other. It may be locked in either position by a quadrant 123 fixed to lever 7 and a spring latch 124 on arm 121. This construction has been used with perfect success in transferring control of the machine from one operator to another during free flight in the air. Obviously the mode of operation of the machine is precisely the same from either seat.

In order to provide a construction of the surfaces 1 and 2 which will allow the same to be inexpensively constructed and earily set up and taken down, I prefer to build said surfaces of similar panels, with sockets by which a panel may be easily fastened to or detached from an adjacent panel, and the sockets provided with the means for attaching the spacing posts to them in order that any number of surfaces may be easily superposed, and in fact any form of machine made without materially weakening the construction. The machine shown is built up of separate panels, one of which is shown in Fig. 10, comprising a frame having a front bar 79, a rear bar 80, side bars 81 and 82 and righ 83, 84. Cloth or any other equivalent air-resisting material 85 is stretched over top and bottom of the frame and may be tacked to the bars and ribbs.

125, 126 are strengthening braces to prevent lateral distortion.

In order to detachably hold the panels, I have provided sockets such as shown in Figs. 7, 8 and 9, made of metal bent into a substantial U-shape. As seen in Fig. 9, the panel 87 is slipped laterally into the socket 88 and fastened by passing the bolt 89 through the socket and side bar. The panel 90 is slipped into the similar sockets 91 and similarly potential. The spacing post is slipped into the sockets 91 and 92, and the diagonal trussing wires 93, 94 attached to the diagonal ears of the socket. If two additional panels are to be provided in the same plane as the other panels, the similar panels 95, 96 may be slipped into the open ends of the sockets and similarly fastened and trussed by the wires 97, 98. The sockets 125 at the rear may be the same, or, if it is desired to extend the surfaces beyond the rear posts, they may be made in two parts by merely cutting off the connecting metal as shown by the dotted lines y—y in Fig. 8. If it is desired to make a machine of three superposed surfaces, or to add or omit any desired panels, it is very easy to do so. For example as shown in Fig. 11, an additional surface 100 has been added above the other two by adding five similar panels with sockets and posts and trussing wires. With such construction the machine may be easily assembled and knocked down, and the cost of construction is materially reduced.

Assuming the machine to be resting on the water, the operator releases his lever allowing the floats 32 and 33 to come to the horizontal position so that they support either side of the machine which tips downwardly. After raising the wheels the engine is started, which will drive the machine through the water, and as it starts the operator pulls on the lever, inclining the balancing blades to the position shown in Fig. 1 and, as the boat lifts somewhat as the speed increases, they barely touch the water as long as the machine is in balance laterally. The rush of the water against them exerts a lift, and depression of one side of the machine causes the blade on that side to enter the water to an extent proportional to the amount of depression and the other blade will rise out of the water. The one in the water exerts a lift due to water-rush against the inclined surface which will restore equilibrium, and the lift decreases as equilibrium is approched. The machine will therefore automatically be kept substantially horizontal. In making a turn to the left or the right on the water, the effect of the rear vertical steering rudder may be supplemented by causing the one or the other balancing blade to exert a drag on the side toward which the turn is to be made. This may be done by depressing either side of the machine by the use of the ailerons. This will cause the machine to tip laterally and the blade on the depressed side to dip into the water to an abnormal extent, and help to turn the machine toward that side. The action of the inclined prow surface 28 of the boat causes the machine to tilt upward somewhat, and the flat hydroplaning action prevents the machine from burying, that is, tipping unduly downward at the rear. When the speed of the machine over the water is sufficient, the operator pulls the lever 7 backward, which tilts the front elevating rudder to a positive angle of incidence, and the two rear elevating rudders to negative angles of incidence, and the machine is thereby rocked backward and with the resulting increase in angle of incidence of the wings rises out of the water. The operator then releases the lever 61, which allows the floats 32, 33 and blades to take the horizontal position where they offer the least resistance to the atmosphere. In descending to alight on the water, the operator shuts off his engine if desired, and glides downward to the water, at the same time pulling on his lever 42 to incline the balancing blades. The inclined hydro-surface 28 strikes the water and serves to turn the machine upwardly from its gliding course, that it will not topple over forward and tend to dive. As it runs forward on the water, the blades keep it in substantial equilibrium. If it is desired to run out onto a beach, for example, the engine may be started or allowed to continue to run, and as the shore is approached the operator releases detent 106 which allows the wheels to drop back to their position shown in Fig. 2 and as they project slightly below the bottom of the boat he may run up on the land. The machine may either rise from the land or water as desired.

I am aware that various modifications may be made in my invention without departing from the spirit of the claims, and I therefore do not desire to be limited to the preferred embodiments herein shown in the drawings.

What is claimed is:

1. A hydroaeroplane comprising aeroplane wings, a longitudinally continuous water-borne base therefor having a hydroplaning surface there beneath arranged to exert its hydroplane lift substantially

(*Continued on page 265*)

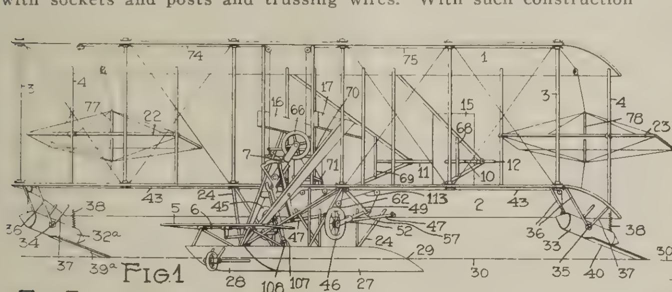


FIG. 1

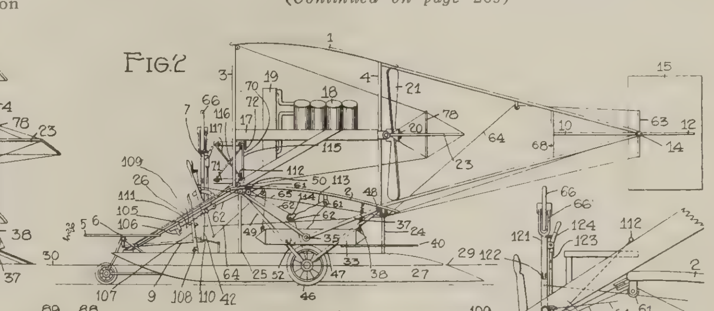


FIG. 2

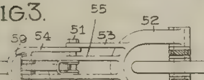


FIG. 3.

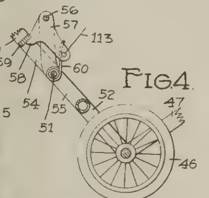


FIG. 4.

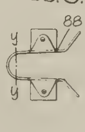


FIG. 8.

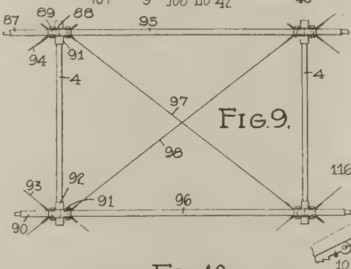


FIG. 9.

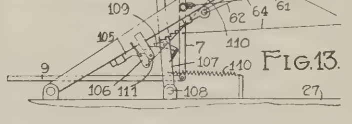


FIG. 13.

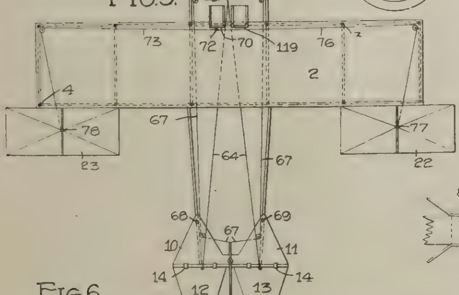


FIG. 5.

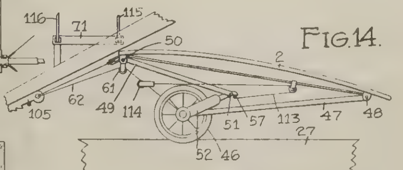


FIG. 14.

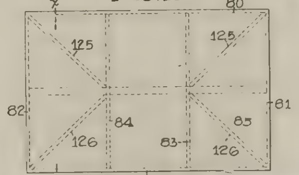


FIG. 10.

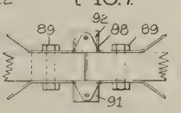


FIG. 7

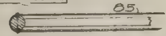


FIG. 12.

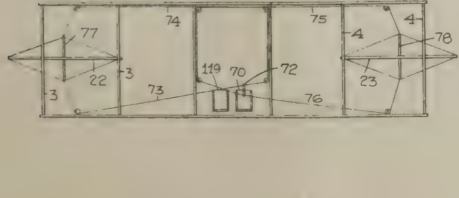


FIG. 6.

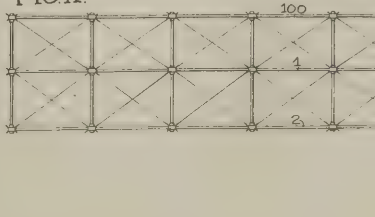


FIG. 11.

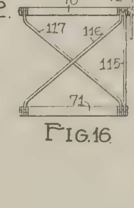


FIG. 16

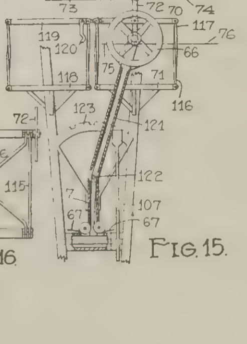


FIG. 15.

THE KNOX 300-H. P. AERO ENGINE

By G. DOUGLAS WARDROP

THE first formal test of the 300-horsepower Knox Aeronautic Motor was held at the company's Springfield factory laboratory on Saturday, Nov. 11th, before aeronautic and automobile journalists and others.

In time of need, American brains always come to the front; and the fact cannot be better illustrated than by the largest aeronautic motor in the world which has just been announced as the work of Frank H. Trego, Chief Engineer of the Knox Motors Company at Springfield, Mass.

Many times in recent years has the attempt been made to build a successful engine of more than two hundred horsepower for the air service.

Our Government is to be congratulated on having within its borders a larger and bettter engine than has yet been built abroad and especially on having the men who can produce promptly the needed things in scientific work as the art progresses. We learn how to build ships which no gun can harm and then we build guns which will make scrap iron out of those same ships. This turn and turn about goes on forever and we have now reached the state of air flight to be able to handle large aeroplanes and this new motor of Mr. Trego is another distinct step in this direction.

This seems today a very large motor, but we predict for the future giants of the air which will make the present aeroplanes seem small and which will require motors of perhaps one thousand horsepower at least by 1925; the growth of this art is so rapid.

The Knox engine is of beautiful design and has every appearance of being a "flying engine" and engineers who have seen it and followed it through the last year have declared it to be by far the finest aeronautic motor in the world today.

It is difficult for the average person to realize what this enormous power means, even when we are told that the four-bladed propeller is fourteen feet in diameter and that it is to turn at 1,100 to 1,200 revolutions per minute. At that speed the effort of the blades to fly out of the hub is about twenty tons each, and the propeller has a pushing power of 2,000 pounds.

A year's research work has been required to bring forth this engine. It is impossible, we are informed, to base the design on past experience in the automobile field except in a general way. New principles must be used throughout and new experiences work through before success can be reached, and the Knox Motors Company has devoted the last year and great expense in reasearch work on this engine.

The motor, weighs complete, including electric starting, electric lighting, tachometer showing propeller speeds, exhaust pipes, ignition apparatus and provision for driving wireless telegraph apparatus, 1,400 pounds.

It was run for a period of eight hours in which its rated 300 horsepower was exhibited during the last hour. The test was carried out on the Company's Sprague Electric Dynamometer of 500 horsepower capacity, probably the largest equipment in the world.

The run averaged from 1,400 r.p.m. to 1,600 r.p.m for the first seven hours, pulling from 200 to 245 h.p. and the 300 h.p. at 1,600 r.p:m for one hour.

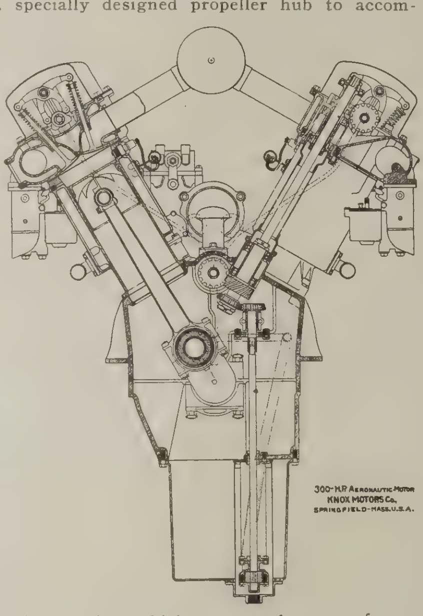
The average h.p. was 243 for the eight hours, making 1,948 h.p. hours, during which 198.4 gallons of gasoline were consumed, making .612 lbs. per h.p.h This, of course, was not the only means of air indication of gas consumption as the motor was running under ¼ and ½ throttle conditions and in a room of average temperature of about 70 degree. Gasoline hydrometer test was 58-60, and the oil used was "Oilzum."

During the test the blower was broken down for over one-half hour during repairs but the oil pressure only went down 5 lbs. during this period and the motor showed no signs of heating, although there was no air of any kind blowing on it.

A stop of 2 minutes was made after the first 40 minutes to change spark plug; but after that no spark plugs were changed, and this in spite of the fact that no air of any kind was blown upon them.

Water went in at 108 degrees F. and 140 degrees F. discharge. The air temperature was 62 at the start and 78 at the finish in the room.

The modern and complete construction of the motor is illustrated by the fact that it has the above equipment and in addition has a specially designed propeller hub to accommodate various thicknesses and types of propellers. Nickel and vanadium steels are used throughout and special aluminum alloys are used in all of the aluminum parts.



General Description

The motor is a 12-cylinder, 4¾ inches bore by 7 inches stroke and is a "V" engine with six cylinders on each side, set at 60 degrees from each other.

The crankcase is a special aluminum alloy casting in one piece and extending 7 inches below from the center line of the crankshaft to give barrel section for strength.

Instead of using legs for motor supports on the crankcase, as is the general practice, this engine is supported by a shelf running the full length of the case on each side of which the motor will rest. Five (5) bolts pass through each shelf into the frame work of the aeroplane and a supporting rib or brace is cast each side of each bolt. The motor is very narrow at this point and will enter a frame 15 inches in width inside with bolt centers 17 inches.

The lower half of the crankcase is an aluminum casting in one piece and is bolted to the upper half. No mechanism is contained in this lower half and there are no pipe connections to make. A glass gauge is attached to the side of the case, showing the oil level at all times.

The cylinders are special aluminum alloy castings with cast iron liners ⅛ inch thick. These liners have a flange on the lower end and are pressed in from the bottom. The cylinders are cast in blocks of three and are held to the case by eight studs each. The cylinders are open at both ends and the upper portion of the bore forms the combustion chamber which is machined all over. The corner bosses are supported by two heavy ribs each and the central bosses run clear through between the cylinders to give strong anchorage. The water jacket extends well down below the bottom of the stroke and ½ inch water space is provided between the cylinders. The piston displacement of the motor is 1,488.53 cubic inches.

The cylinder heads are cast in blocks of six, of special aluminum alloy and cast iron valve seats are cast integral with the head. The head for each six cylinders is held down by 16 nickel steel studs passing clear through the head. There are four valves to each cylinder carried in the cylinder head and the water jacketing is so arranged that each valve seat is practically surrounded by water.

Camshafts and rocker arms are carried in the head, the camshafts having eight bearings and the rocker arms being supported above it, as is well illustrated in the photographs.

The camshafts as well as the rocker arms and all mechanism in the head is under forced feed lubrication and drainage is provided back to the crankcase at the center when the motor is in normal position and at each end when the motor is tipped up or down .

Each cylinder head has an aluminum cover which completely conceals and protects all of its mechanism.

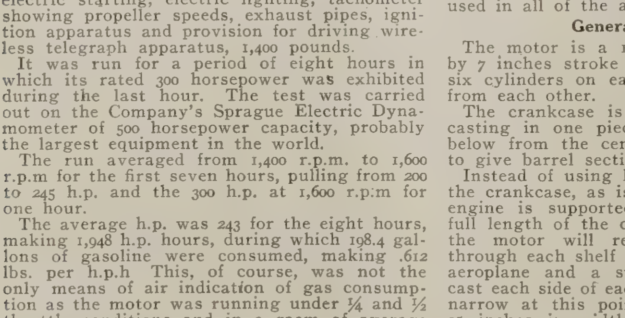
On one end of the motor is a heavy special aluminum alloy casting to support the propeller shaft with its bearings, in which the ball bearing holes are lined with steel bushings to prevent the bearings from wearing the aluminum. This casting with its covers provides for the large starting gear on the propeller shaft as well as supports for the starting motor, switch, etc., and protects all of this mechanism from flying pebbles and water.

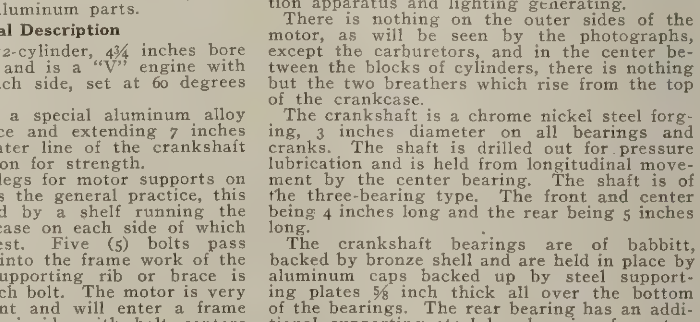
On the other end of the motor is the aluminum housing for the timing gears and the support of the water pump, air pump, ignition apparatus and lighting generating.

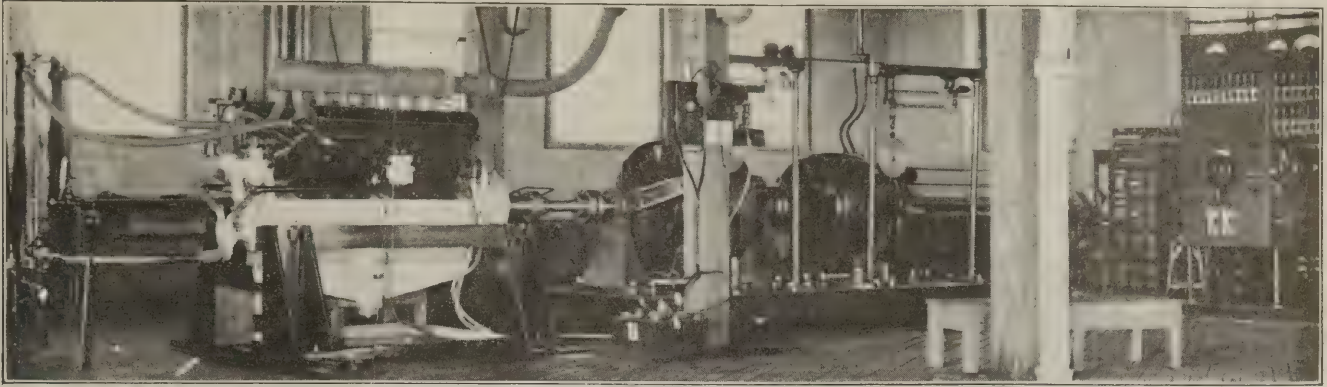
There is nothing on the outer sides of the motor, as will be seen by the photographs, except the carburetors, and in the center between the blocks of cylinders, there is nothing but the two breathers which rise from the top of the crankcase.

The crankshaft is a chrome nickel steel forging, 3 inches diameter on all bearings and cranks. The shaft is drilled out for pressure lubrication and is held from longitudinal movement by the center bearing. The shaft is of the three-bearing type. The front and center being 4 inches long and the rear being 5 inches long.

The crankshaft bearings are of babbitt, backed by bronze shell and are held in place by aluminum caps backed up by steel supporting plates ⅝ inch thick all over the bottom of the bearings. The rear bearing has an additional supporting steel bar hanging from two bolts which pass down from a bridge over







the top of the crankcase. Just above the crankshaft and driven by the timing gears is the horizontal drive shaft, which has two spiral gears integral with it at the center of the motor and this shaft drives two vertical shafts whose gears are integral with them. These shafts pass up through tubes into the cylinder head and on through a hollow short shaft, finally terminating in a splined end over which a splined cap piece is fitted and bolted to the short hollow shaft. By this means the relation of the camshaft to the vertical shaft is fixed for valve timing. The oil drainage from the cylinder heads passes down through the ball bearings on the vertical shafts and through the tubes to the crankcase proper.

The pistons are of special aluminum alloy castings with three rings. The piston pin is held firmly in the upper end of the connecting rod and has its bearing in the piston where the aluminum alloy acts as a bearing metal.

The connecting rods are drop forgings and the bearing cap at the shaft end is held by two bolts, cap and rod being locked together by tongue and groove to prevent twisting. The rods run side by side on each crank.

The oil pump hangs from the upper half (a patented feature) so that there are no pipe connections between the pump and the motor. Steel pipes are cast integral with the crankcase and the register with the oil pump to make the connections. The oil holes drilled in the case for lubrication are lined with steel tubes to insure against any leakage due to porosity in the aluminum.

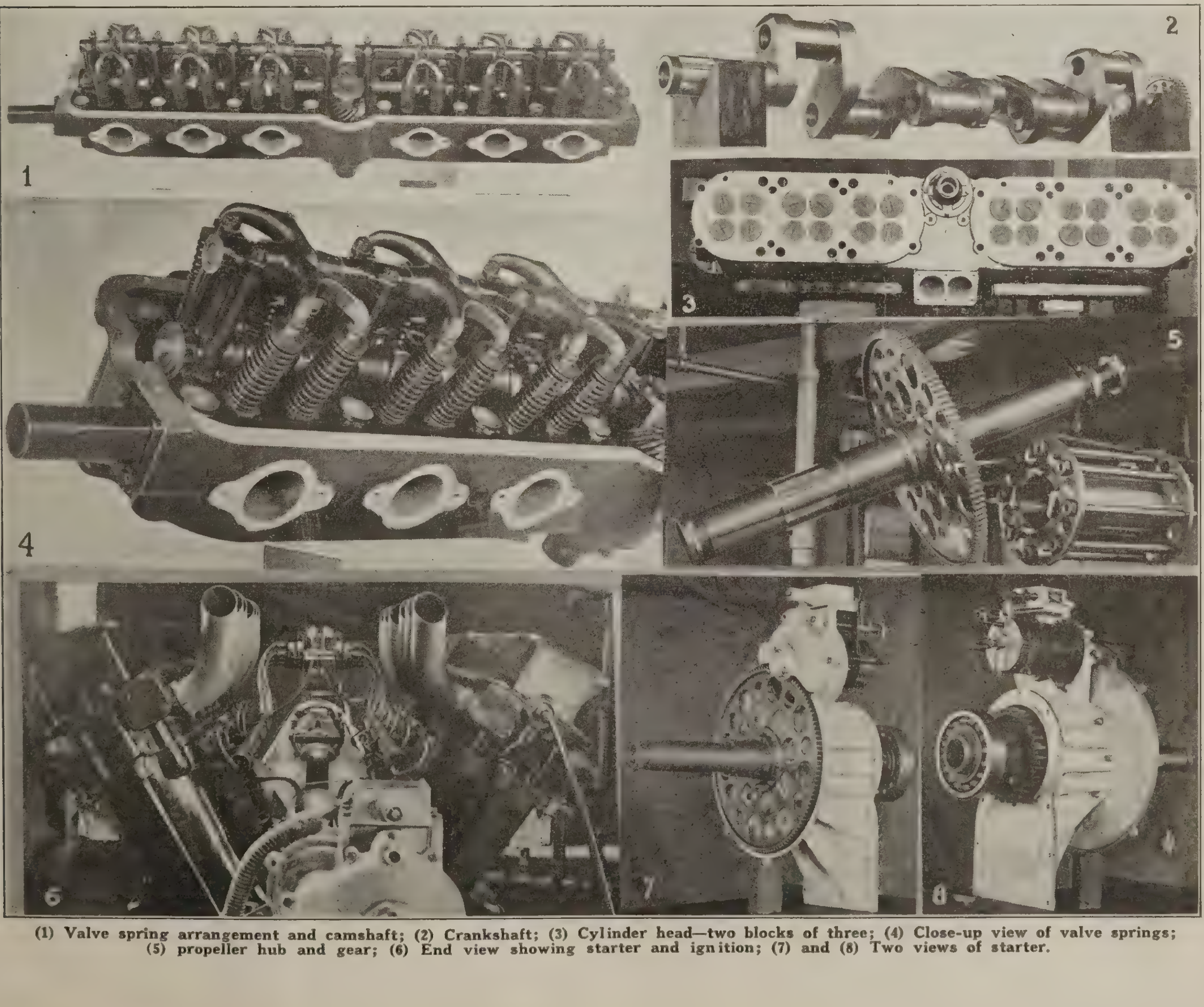
The main oil lead pipe runs the full length of the case and is of large diameter. The holes are drilled from the crankshaft bearings into this pipe, said holes then being lined with steel tubing as mentioned above. The oil is taken from the crankshaft bearing at the timing gear end to the horizontal drive shaft bearing just below it and from there is led through this hollow shaft back to the center or other end of this shaft and from there taken through copper tubes to the cylinder heads. In the head the oil passes through the camshaft supporting brackets into the hollow camshaft thence to all its bearings and also passes up the rocker arm shafts which are hollow and thence to each rocker arm. The result of this being that valve stems, springs, rocker arms, rollers, camshafts, etc., are saturated with oil at all times.

Timing gears are lubricated by the "sling-off" from the crankshaft bearing at that end and the propeller gears are supplied in the same manner at the other end.

A large oil screen is carried in the lower half and covers the pump clear up to the upper half. This screen can be readily withdrawn for cleaning without disturbing any mechanism. Forty to seventy lbs. pressure is carried at all times and an adjustable regulator is provided on the side of this crankcase.

The propeller shaft is carried on heavy double row self-aligning ball bearings and the thrust is taken in either direction by double ball thrust bearing with load capacity of 2,650 lbs. in either direction. The shaft is 3⅜ inches diameter bored out to have ½ inch walls. On this shaft is located the starting gear which through a train of gears is connected to the starting motor through a special roller clutch. The propeller end of this

(*Continued on page* 265)



(1) Valve spring arrangement and camshaft; (2) Crankshaft; (3) Cylinder head—two blocks of three; (4) Close-up view of valve springs; (5) propeller hub and gear; (6) End view showing starter and ignition; (7) and (8) Two views of starter.

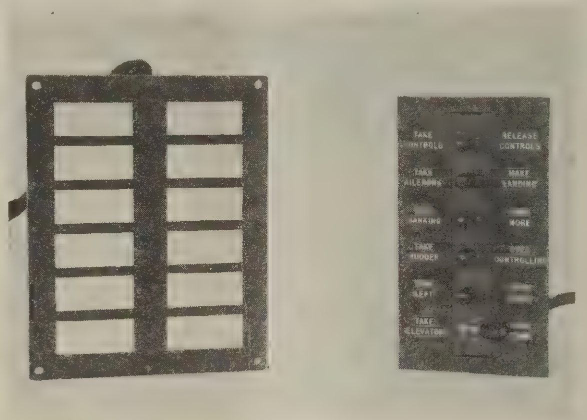
THE INSTRUCTOGRAPH

TO facilitate the instruction of pupils in the modern two-passenger tractor aeroplane, the Sperry Gyroscope Company of Brooklyn, N. Y., has brought out an instrument aptly named the "Instructograph." Prior to the advent of this clever device the Pilot-Instructor, occupying the rear seat of the machine, depended on twitching the various controls, after attracting the attention of his pupil-passenger by kicking the back of the forward seat, for imparting such instruction as was necessary. This crude method of communication is very dangerous, as at times neither pupil nor instructor know whether the control of the plane is in their hands or not. Several of our most lamentable aviation accidents have been directly caused by this lack of efficient means of communication.

The "Instructograph" consists of three units: the transmitting unit, the receiving unit and a battery case, and while the pieces are of wonderfully light and compact construction, the complete installation weighing but 6 pounds, without batteries, they have been designed for the strength and durability necessary for the hard usage they will be subjected to in service.

The "Transmitter" consists of a case, of light metal construction, about six inches long, three inches thick, and an inch wide. A series of six double throw keys project from one edge, to the right and left of which extend engraved plates, bearing all of the instructions commonly used in teaching the art of flying. The keys, which are of such size that they can be easily handled with gloved hands, can be thrown to either the right or left, remaining in the position placed until released by a touch, when they fly up to their normal, vertical position. The twelve instructions themselves, neatly lettered, have been chosen with great ingenuity and are so placed that actual air work cannot necessitate the use of both of the two directions, placed by each of the keys, at the same time. The case itself can either be fastened by the side of the instructor, or set into the instrument board before him, as found convenient.

The "Receiver" is a box approximately seven inches long, five inches wide and slightly over one inch thick, adapted to fasten on the wheel of the front control itself in the front cockpit of a tractor, under the cowl, or in the instrument board. Its cover is perforated by twelve oblong windows, closed by translucent white celluloid, with no lettering of any kind visible to confuse the pupil. When one of the keys of the "Transmitter" is thrown, the corresponding direction appears on a window in dense black against an illuminated white background. Three of the directions: "Nose Down," "Over Banking" and "Over Controlling" flash out in black against a red background, clearly indicating the urgency of the command. An ingenious arrangement of small electric light bulbs enables this method of communication to possess the advantage of positively attracting the pupil's attention whenever a word of instruction is given, it having been found experimentally that the flash of light accompanying the change of direction catches his subconscious attention. To safeguard against the possibility of a burned out bulb preventing the direction from being received, the circuits are so arranged that a second lamp remains lighted.



The third unit of this instrument comprises a small, light battery case for holding dry cells of standard size, which is constructed with fastenings so that it may be attached to any part of the machine that is found convenient. The three parts of the "Instructograph" are connected by a single cable, of such length that the whole apparatus can be instantly attached to any of the standard aeroplanes now in use.

If it is desired the separate battery case may be eliminated and the "Transmitter" unit built to contain the batteries necessary for operating the instrument. These are four in number and are of standard construction, being the type used in pocket searchlights, obtainable at any well stocked hardware or drug store. This containing case is designed that new cells can be instantly inserted when necessary contacts are closed by replacing the case cover. A set of cells gives from eight to twelve hours' service

PRODUCTION OF HYDROGEN BY ELECTROLYSIS

By HARRY L. BARNITZ, Ph. G.

(Copyright 1916, By Harry L. Barnitz)

Section II of Part 1 of Three Series.

IN this process water is decomposed into its constituent elements, oxygen and hydrogen, by the aid of the electric current. The electrolytic generators, or cells, are of two types: the unit type is composed of an outer tank, which serves as the negative electrode, and a perforated inner tank made of special composition iron which serves as the positive electrode. The two electrodes are separated by means of a specially prepared asbestos diaphragm which divides the appa-

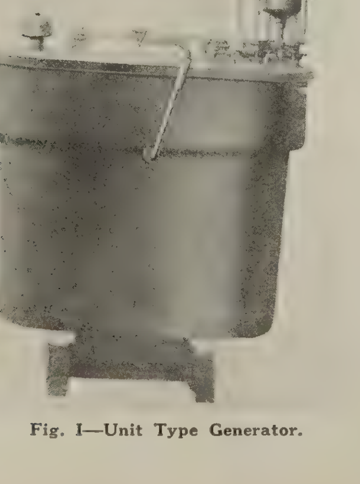
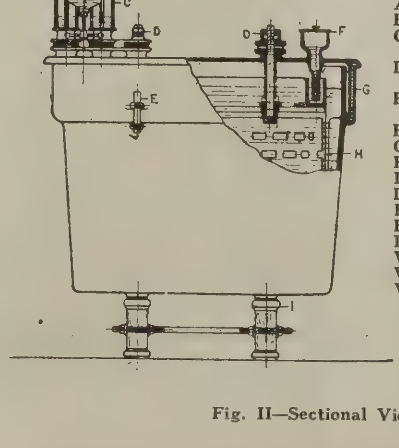


Fig. I—Unit Type Generator.



A—Oxygen offtake.
B—Hydrogen offtake.
C—Indicator and pressure equalizer.
D—Positive electrode terminals.
E—Negative electrode terminals.
F—Filling cup.
G—Hydraulic joint.
H—Diaphragm.
I—Insulating supports.
Dimensions of Generators:
Height of cell 2′ 10″.
Height over all 5′ 6″.
Length over all 3′ 9″.
Width over all 1′ 9″.
Weight empty, 1000 lbs.
Weight full, 1500 lbs.

Fig. II—Sectional View

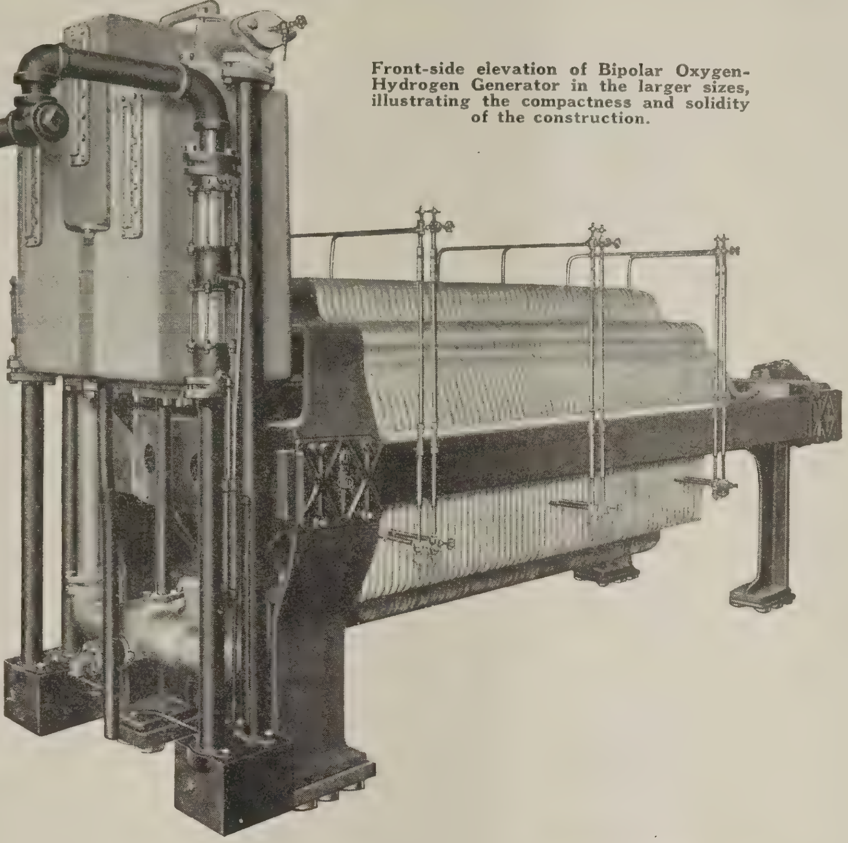
ratus into two compartments. On top of the cover are the current terminals, two sight feed indicators and pressure equalizers, also a cup through which water is introduced into the cell from time to time.

As soon as the electric current is applied hydrogen and oxygen are seen to bubble through the indicators. The electrolyte is an aqueous solution of caustic potash or soda, which serves to make the water a good electrical conductor. In each cell about 1 gal. of water is decomposed, per 24-hr. day, producing 153.6 cu. ft. of hydrogen and 76.8 cu. ft. of oxygen. The hydrogen is liberated on the walls of the outer tank (negative electrode), while the oxygen forms on the walls of the inner tank (positive electrode). The hydrogen is carried up through suitable means to the hydrogen equalizer, where it bubbles through water and passes on to the hydrogen off-take pipe; the oxygen similarly passes through the oxygen equalizer and thence to the oxygen offake pipe. Each cell produces per kilowatt hour, 8 cu. ft. of hydrogen and 4 cu. ft. of oxygen. The current required per cell is 400 amp. at 2 volts. The purity of the electrolytic hydrogen is 99.8% and the oxygen 99.6%.

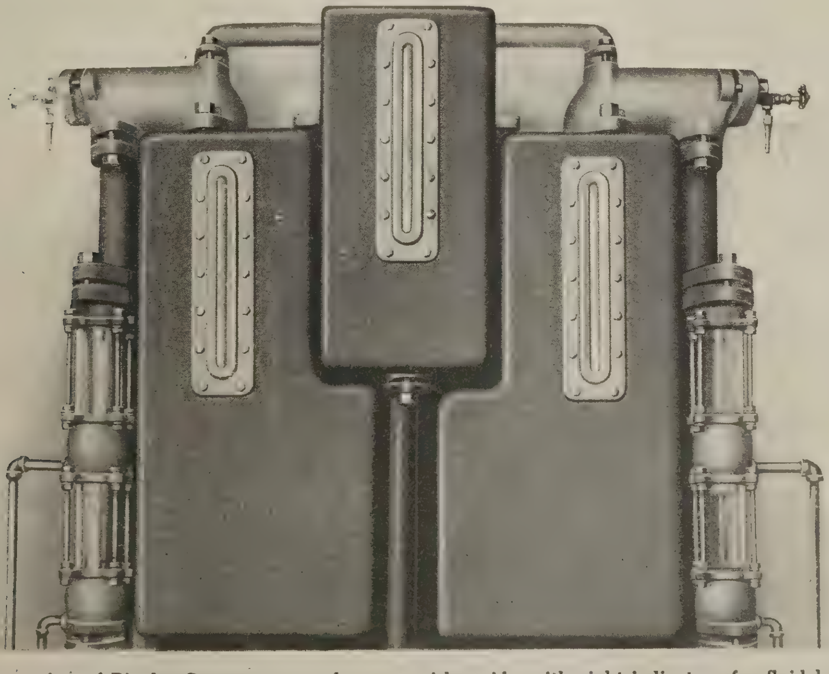
The cost of hydrogen by this process, disregarding the value of the evolved oxygen, is about 1/8 of a cent per cubic foot at a current cost of 1 cent per kw.-hr. at the generator. For small or moderate size plants where low cost current is available the electrolytic process will command attention for the production of hydrogen.

The features of this process are: (1) the simplicity of operation; (2) the moderate attention required; (3) raw material required is 1 gal. of water to be added to each cell per day. The plant can be operated continuously or intermittently; the process is clean and the cell produces gas as soon as the current is turned on.

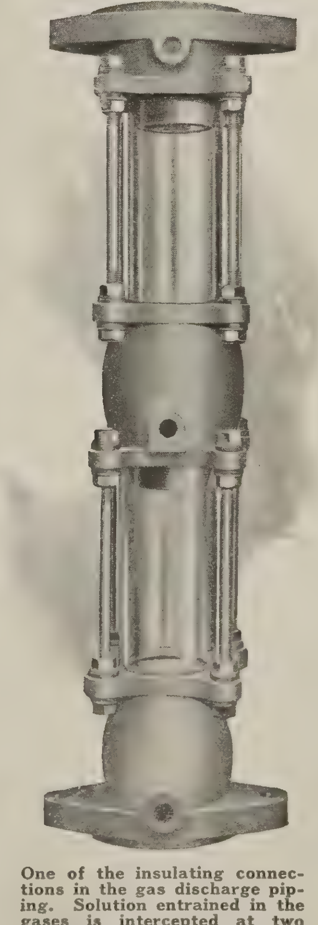
Another variation of the unit type generator or cell is the bipolar generator recently placed upon the market. This type of generator is of the filter press type, but is not a modified filter press. While the form of this generator was early introduced in the art the bipolar type only resembles same in form. This type of generator is to be commended where floor space



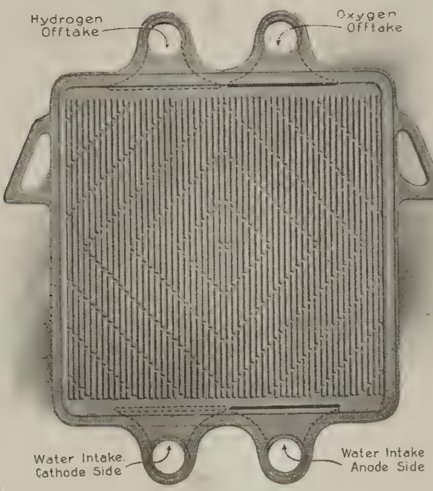
Front-side elevation of Bipolar Oxygen-Hydrogen Generator in the larger sizes, illustrating the compactness and solidity of the construction.



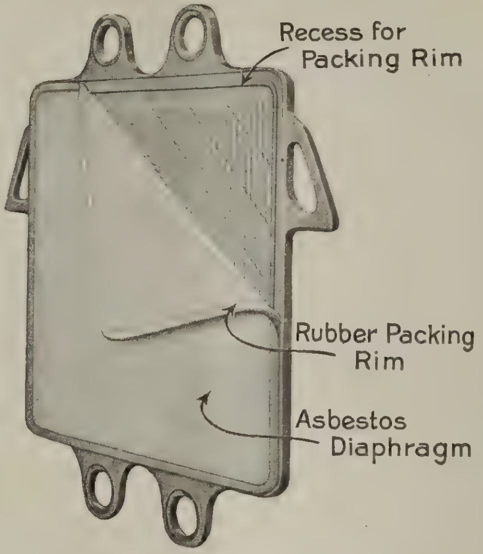
Upper front view of Bipolar Generator; gas domes at either side, with sight-indicators for fluid level; solution tank in the middle, with sight-indicator for fluid level; gas offtakes at top of each gas dome, connecting downward with the purgers at either side; drain pipes in place attached to insulating connections.



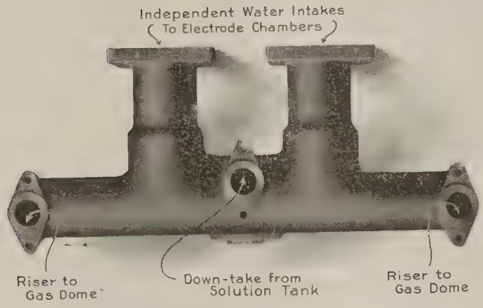
One of the insulating connections in the gas discharge piping. Solution entrained in the gases is intercepted at two points and drained off through the openings shown in the middle and bottom sections.



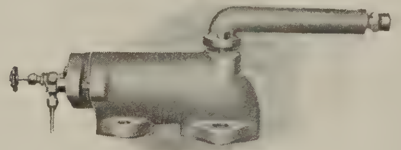
View of electrode from anode side, showing water intake and gas offtake channels, and the corrugations which facilitate release of gases.



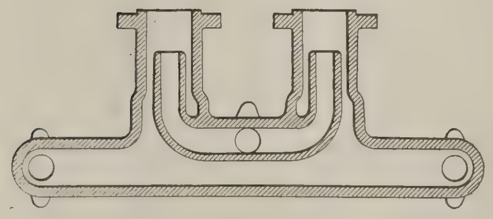
Electrode with diaphragm partially removed, showing the method of holding and packing the diaphragm.


Independent Water Intakes (To Electrode Chambers)
Riser to Gas Dome
Down-take from Solution Tank
Riser to Gas Dome

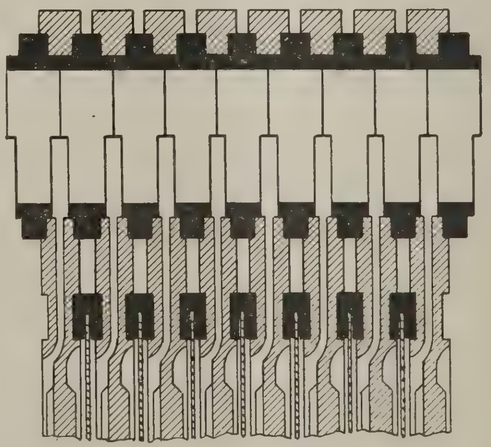
Top view of water-feed manifold, with the various connections indicated.



Gas offtake connection for top of gas domes, with a signal whistle which automatically gives notice when the level of the solution in the generator falls below the prescribed limit.



Horizontal section of water-feed manifold, showing the internal diverting nozzles which direct the water feed from the solution tank (middle connection) into the water intakes to the electrode chambers. The two end connections are for the risers to the gas domes.



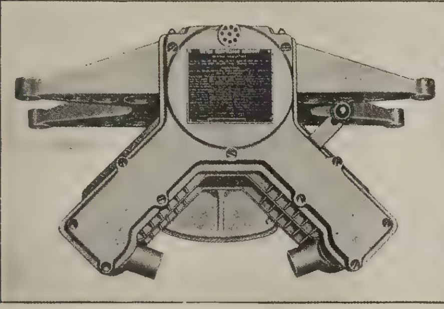
Partial section through assembled electrodes, diaphragms, and gas offtakes showing method of internal insulation by means of diaphragm packing rim and nipples in the gas offtake which clamp up to make a continuous insulating tube.

is a consideration, as it is more compact than the unit type cell. The bipolar generator is made in two sizes. The 4x11 feet has a rated daily capacity of 1,700 cubic feet of hydrogen and 850 cubic feet of oxygen. Size 5x15 feet has a rated 24-hr. capacity of 7,000 cubic feet of hydrogen and 3,500 cubic feet of oxygen. The above capacities are based on the use of caustic potash as electrolyte. Purity of the hydrogen is 99.8 per cent and oxygen 99.6 per cent. The cost of the gases produced is about the same as in the unit type. The bipolar generator is to a great extent automatic; requires only moderate attention and can be operated continuously or intermittently.

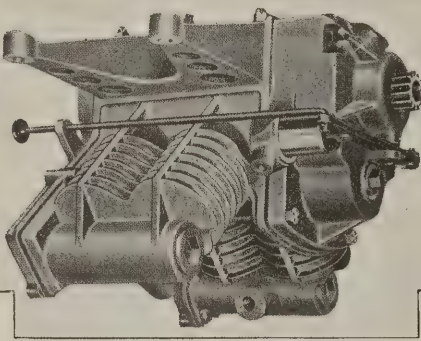
(Mr. Barnitz's next article on the production of hydrogen (Part II to follow) will be The Rinker Wolter Process—a Chemical Process for the Decarburation of Oil with illustrations of a portable hydrogen plant mounted on railway trucks as used now by the Russian War Department.—Editor.)

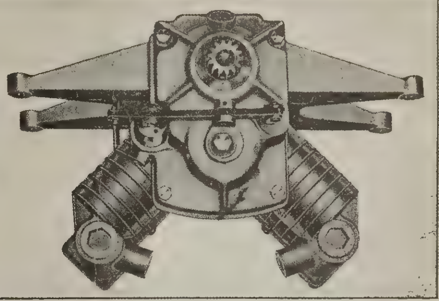
THE “PERFECT” STARTER FOR AEROPLANES

SEVERAL years ago the idea occurred to a number of the leading engineers of the country, of providing the initial rotation for internal combustion engines. Compressed air was the prime element to enter their minds as the most feasible thing to accomplish the purpose. This choice of energy was resultant from the successful application of air in all instances where high powered, stored energy was available for use as in intermittent impulse tools and devices; such as air brakes on all steam and electric trains throughout the world, air riveters, air drills and torpedo service in the navies of the world, etc. Up to the present time the automobile, motor boat and aeronautic fields have not been given a thorough study as to their natural requirements. Therefore, only the most primitive and inferior application of air as an energy for self-starting has been the result.



Front End View





Transmission End

The aeroplane model of the “perfect starter” is a device convertible to either an air motor for cranking or starting, or an air compressor for storing air into a suitable tank for its own energy when operated as a starter.

It has four cylinders, two each arranged at 90 degrees apart, all being in action either as a motor for starting, or as a compressor when supplying air.

A transmission is combined in the construction of the device, taking care of all changes of operation.

The device is entirely self-contained, and may be coupled direct to the crankshaft of the engine to be started, with no other gear reduction or adaptation than a suitable coupling.

It is entirely idle, excepting when in action as a starter or as a pump. To start, a button is pressed on the control valve, and to pump when the engine is running, another button is pressed on the control valve, the device is then converted to a pump and releasing automatically and becoming idle at the maximum pressure.

It has power to start on the magneto ignition, engines having 8 and 12 cylinders of 5 x 7-inch bore and stroke, and 100 lbs. compression at a speed of 150 to 200 r.p.m.

As a pump it supplies a full tank of air to 240 lbs. for 10 to 20 magneto starts, in from 28 to 60 seconds, depending on the speed at which it is driven.

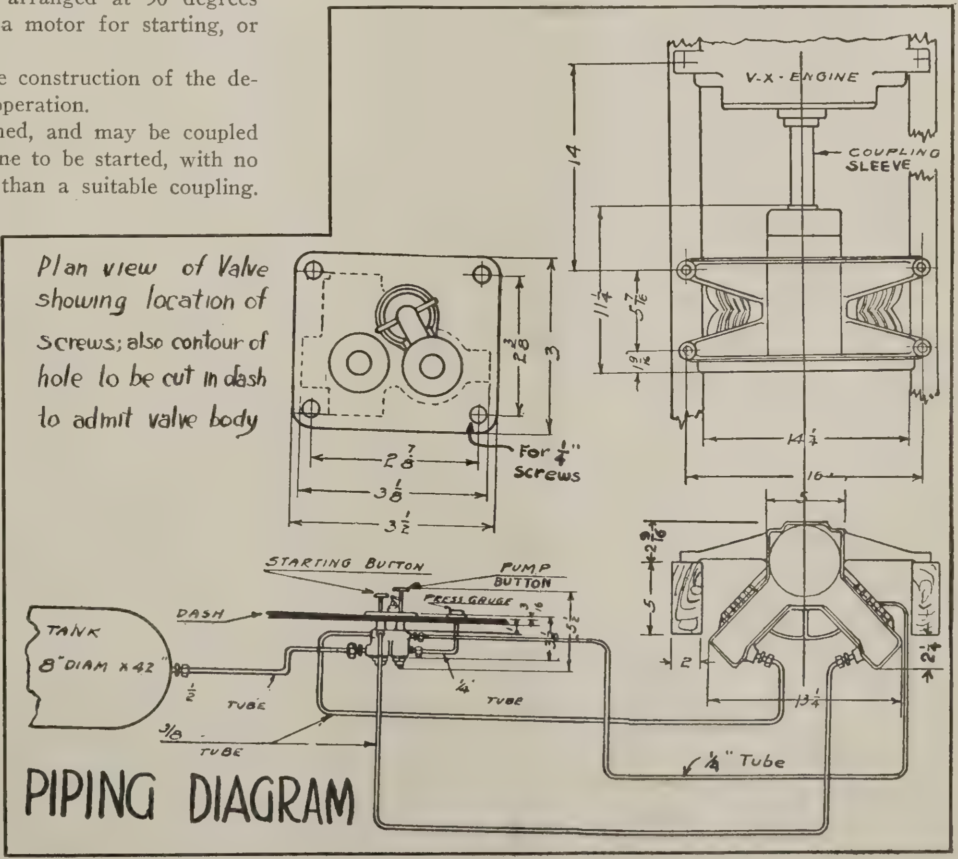
The device weighs 39 lbs. Complete with all fittings, tank, control valve, gauge, tubing, etc., it weighs 70 lbs. That is, with the heavier gauge tank, but where a special tank tested to 500 lbs. only is used, this weight is reduced to 65 lbs. For engines having smaller bore and stroke than above mentioned, a starter that will weigh, complete, but 50 lbs. can be supplied.

The cylinders and entire casings are of aluminum, having cast iron sleeves for cylinders shrunk in and dowel pinned. Gears, crankshaft, etc., are of nickel steel. The crankshaft is carried on two roller bearings. Other bearings are of best special bronze metals. Most parts are hardened and ground, and the device embodies the best workmanship.

One manufacturer of aeroplane engines said that it required 7 h. p. to make their engine spin at 100 r.p.m.; the same engines this device spins at 200 r.p.m.

It is possible to pump the tank to maximum pressure from 100 lbs., in 28 to 40 seconds; also to start and stop 10 to 20 times in 2 minutes.

This starter is manufactured by the Motor-Compressor Co., 52-60 Dickerson street, Newark, N. J., and all inquiries directed to them, relative to this device, will be assured of careful attention.

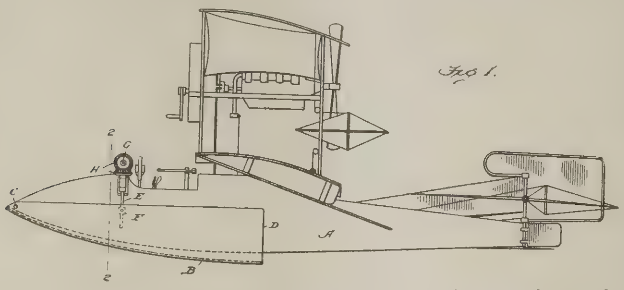


PROTECTIVE DEVICE FOR WATER-CRAFT

JOSEPH A. STEINMETZ, president of the Aero Club of Pennsylvania, has secured a patent on a protective device for water-craft which has several points of interest. The patent was granted October 3. The specifications and claims read in part as follows:

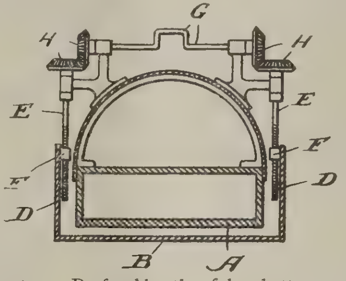
To all whom it may concern:

In flying and skidding boats it is usual to provide the flat bottom of the boat with an offset or step nearly in line with the center of gravity and below the same, the flat bottom of the boat curving gradually upward from this step to a point ordinarily above the water line and at the forward part of the hull, so that as the boat rises or descends when in part supported by the water and advancing rapidly, the supported surface is gradually varied from a maximum to zero or conversely. I provide the forward part of the boat, which is primarily made without such step, with an external swinging shield or false bottom extending rearward from the nose of the boat to a point in the region where the step is usually located. This false bottom protects from injury that portion of the true bottom which is most liable to injury, permits varying at will the height of the step formed by the false bottom, and is quickly replaced when injured. It follows that a boat provided with my devices may be adjusted for different conditions and is far less likely than the ordinary boat to be put out of commission.



In the accompanying diagrammatic drawings, Figure 1 is a side view of a boat provided with my device. Fig. 2 is a section on the line 2—2, Fig. 1.

In these views, A represents the body of a boat primarily without a step or offset in its bottom and provided with many of the usual sustaining, propelling and steering devices which are not of my invention. A readily replaceable false bottom member B, preferably curved to conform nearly to the true bottom of the boat, is pivotally connected to the boat at C near the forward end of the latter and provided with approximately rigid lateral flanges or walls D which extend upward in proximity to the lateral walls of the boat, respectively. This structure extends rearward to the point where it is usual to form a step or offset in the boat's bottom, or about to the line of direction of gravity of the apparatus. Means are provided for angular adjustment of the false bottom about its pivotal axis, and for illustration, I have shown screws E, E, engaging nuts F, F pivoted to the walls D, D, and rotated in unison by a crank shaft G and gearing H, H mounted upon the body of the boat and actuated at will by the operator. Preferably the false bottom and its side walls or flanges, which may be integral therewith, are of sheet metal.



When the boat is to be used for skidding for long distances and at high speed with relatively low engine speed, the rear end of the false bottom is brought up against the true bottom eliminating the offset and giving the boat, if properly made, the most desirable contour for such work. At other times the rear end of the false bottom is forced downward to give a step of any desired height, according to such conditions as may exist.

Obviously the construction may be greatly varied while still embodying my invention, in its broader aspects, and may be applied to protecting widely different craft, the false bottom and intervening space minimizing the effect of anchored or floating mines, for example, even better than making the hull of the vessel double walled.

What I claim is:

1. The combination with a boat of the class described, of an external trough-like false bottom protecting the forward portion of the true bottom, and means for at will varying and positively fixing the distance of the rear end of the false bottom from the true bottom.

(Continued on page 266)

BENOIST "STEEL CLAD" TRACTOR BIPLANE, TYPE 17

THIS Type 17, cross-country plane is simply a development of the several different models of tractor planes, manufactured by the Benoist Company under the designs of Tom W. Benoist during the last four years.

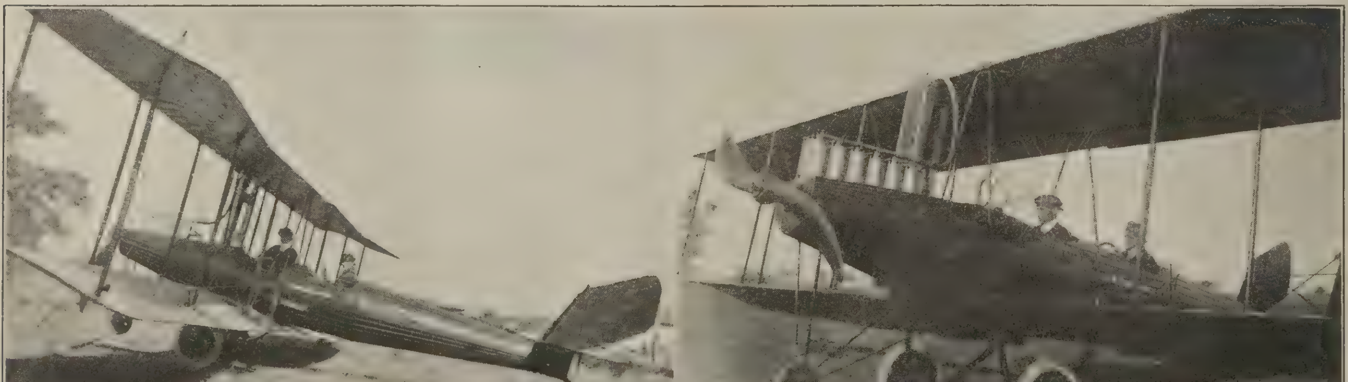
The first tractor model was brought out early in the spring of 1912, and each year since then a new model has been brought out differing only in small details of design and construction from the one of the preceding year. Any improvements resulting from experiments and observations and tests during one year was developed during the winter months and incorporated in the model for the following season.

This new Type 17 differs quite radically from the older types and for that matter from other standard types constructed by other manufacturers at the present time. The running gear is practically the same as last year, only a small wheel is put some distance in front of the two large carrying wheels, thereby eliminating to a certain extent the possibility of turning over on her nose, one of the most troublesome things with well-balanced tractor machines, especially when in the hands of inexperienced aviators who lack the expertness only to be attained by years of experience and practice in landing machines on rough and unfamiliar grounds.

However, the most noticeable improvement, and what would appear to be a practical advance in the constructional development of aeroplanes is the entire absence of cloth, wood and wiring in the complete body of the plane. The fusilage, cockpit, and empenage being entirely constructed of sheet steel. This will, of course, eliminate the liability of fire to a great extent and allow of a more sure figuring of the factors of safety of these important parts.

Its general dimensions and specifications are: Spread, 45 feet; chord, 5 feet; cap, 6 feet; aspect ratio, 9; fore and aft overall, 24 feet; wiring, 19-strand Roebling cable. All carrying guy wires being doubled and on separate turnbuckles; struts and ribs made of spruce; surfaces covered with unbleached Irish linen, treated, doped and finished with Valspar; large ailerons hinged to the outer sections of wings. Running gear equipped with two 26 x 4-inch streamline wheels with double tube clincher tires, and one small front wheel, 20 x 2, single tube tire. Motor, one hundred horsepower, six-cylinder, Roberts aviation motor, 8′ 6″ x 5′ 3″ pitch Paragon propeller turning at thirteen hundred revolutions per minute.

Speed, minimum, 40 m.p.h., maximum, 65 m.p.h. Will carry aviator, passenger, one hundred pounds of extras and enough gasoline for four hours' flight.

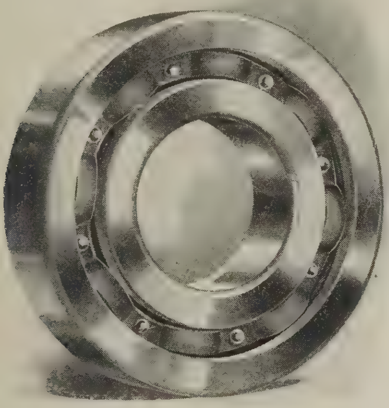


ACCESSORIES

Hess-Bright Bearings

THE Monarch Bearings, manufactured by the Hess-Bright Mfg. Co., is a single row annular bearing of the Conrad type, similar to their regular bearings with which they are interchangeable, but having deeper ball races.

It is not a new bearing, since it was designed and first constructed by them over eight years ago to meet the requirements of an exceptionally severe service. Its success was so great that the number of applications steadily increased with ever widening field until after about six years of most gratifying experience, it was decided to more generally offer their use, to which end they increased their facilities.



The deep race grooves are secured without a lessening in the thickness of the ring at the bottom of the ball track, by increasing the radial width of the race sides. This adds material to the cross section of the ring where it will be most effective in increasing its stiffness, while at the same time, its tensile strength is also increased. The advantages resulting from the deeper, stiffer rings, coupled with uniformity in cross section, are as follows:

First—The rings can be ground with greater accuracy, that is, made more truly circular, than rings of normal depth of grove, since there is less chance for deformation in chucking for the various grinding operations.

Second—They better bridge the space between adjacent balls and therefore deform under load, the tendency of which is to deflect the rings between the balls. This makes for smooth, quiet running and long life.

Third—It all too frequently happens in machining that the bore of housing into which the outer race should be fitted with a great slip, or sucking fit, is not perfectly round, or the lack of sufficient rigidity in the housing causes it to distort under load. This results in support of the bearing at a few points instead of uniformly around the circumference, which in turn tends to distort the outer race and that in turn to cause wedging of the balls. When it is realized how small is the clearance between balls and races—not more than one ten-thousandth part of an inch—it will be seen how often an apparently almost perfect fit will seriously cramp the balls. Indeed, if the outer race be driven (as it never should be) into a housing only slightly out of round, some of the balls will be wedged so hard as to indent the ball tracks, thus rendering the bearing unfit for service. The more rigid deep groove outer ring of Uniform cross section better resists these destructive agencies, some of which are present in greater or lesser degree in nearly all applications.

Fourth—The proper fit of an inner race is a "light drive," on a perfectly round and ground shaft, clamped with permanent side pressure between nut and shoulder or equivalent devices. If the fit be too tight it will ordinarily expand the race until the minute clearance between the balls and races is taken up, resulting in hard running, or permanent injury. If the shaft seat be not truly round, the drive fit upon it will, in the general case, deform the inner race, with resultant damage or binding in the bearing. The deep groove inner race provides both greater strength and greater stiffness to resist these tendencies and their harmful results. The wide inner race sides also make easier the problem of securing side clamping.

The Hess-Bright Co. covers defects of material or workmanship developed within one year from date of sale. They will remake or replace, free of charge, *at their factory,* any bearing returned to them, transportation prepaid, which their examination discloses to have been defective.

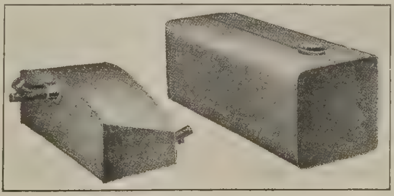
The A. C. Titan Plug

The Champion Ignition Company is now making a A. C. Titan plug in a long-body metric size particularly adopted to foreign cars and aeroplane engines. After extensive tests in comparison with the best European makes, the Renault Company, makers of the famous French Renault car, have adopted it for regular equipment.

This plug is furnished either with regular length of thread or with extension.

"Special Process" Tanks

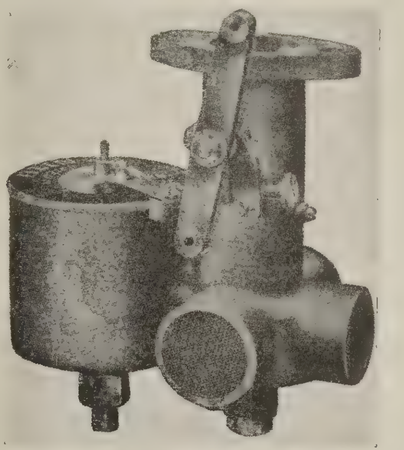
Gasoline tanks manufactured by the A. B. & B. Specialty Co., of Milwaukee, Wis., are claimed to be similar in construction to pressed steel tanks, yet costing but one-half as much. Where reliability is not sacrificed for low cost, specially designed tanks such as these are worthy of investigation.



The A. B. & B. Specialty Co. asks you to put your tank problems up to them—and offer to "give you the right solution, and meet any requirement." This company has an up-to-date factory with unsurpassed facilities for making gasoline tanks of every description.

The Zenith Carburetor

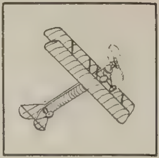
The prime requisite in aeroplane carburetion is unfailing reliability. Each part must continue indefinitely to deliver results. This has led to extreme simplicity in design because the fewer the parts to get out of order the less chance of failure. In carbureting aeroplane motors simplicity is now playing a big part. Very rapidly the rigid Zenith has been adopted by nearly all the important motor makers. In flying from sea level into the rarified air of high altitudes the Zenith gives superior results. It is simply a plain tube device offering no restriction to the free "breathing" of the motor, and the compound nozzle of the Zenith offers true compensation at all times. It is used by the Aeromarine Curtiss, Hall Scott, Sturtevant and Kemp makers.



The question of heating the air supplied to the carburetor is of great importance when used on an aeroplane traveling at high speed and great altitude, and in this respect the Zenith lends itself readily to heating either by means of water or air, depending, of course, on the type of motor used.

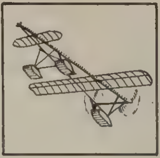
Naiad Aeroplane Varnish

The Naiad aeroplane varnish, a solution for varnishing wing surfaces offered by the C. E. Conover Co., 101 Franklin street, New York, is among the best varnishes obtainable in this country. In using the varnish the cloth should be stretched on the wing temporarily and left there for two or three hours, after which it should be restretched and fastened on the wings permanently. Three coats of the varnish should be applied, allowing one hour for drying between each successive coat. It is also well to run over the cloth after each coat with sand paper, and it is suggested that it is always better to apply the varnish on a dry day.



MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Aero Science Club of America

The month of October was marked by increased activity among the members. An advertising campaign, with the aid of several leading magazines, has been started to secure new members for the Club and interest wider circles in aeronautics.

It will be in the interest of every Club in the United States to secure Junior members and to teach them model building so as to develop this art of Model Construction to the benefit of science and the aeronautical industry. Models of today are no longer toys but means of scientific research and, probably, later on, the fundament for aerial torpedos.

The final competition for the Villard Trophy was held at Garden City, October 26. The best flights were as follows:

Mr. C. W. Meyers, 1,935 feet.
Mr. Robert King, Jr., 1,422 feet.
Mr. Rudolph Funk, 1,315 feet.

The models used were of the twin pusher monoplane canard type.

At the meting of November 4th, the representation of the Club at the Pan-American Exposition was discussed and decided to give an exhibition of the historical development of model aircraft and the various types of rubber strand and engine driven models.

For further information address the Secretary.

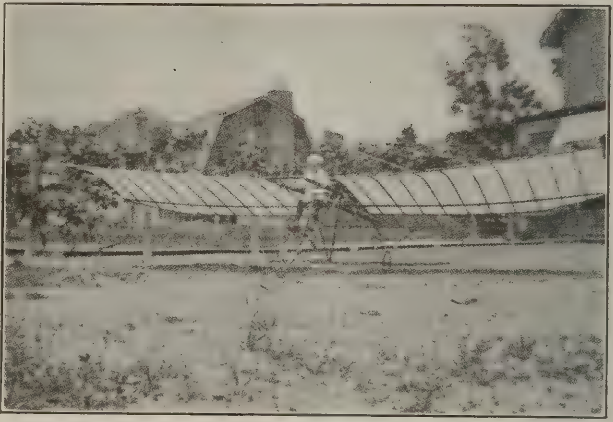
Boy Scout Aviation Meet

Marion Loutt, representing Boy Scout troop No. 61, and Noble Butler, representing troop No. 18, both of Indianapolis, Indiana, won first and second places in the Boy Scout aviation meet, held at the state fair ground, Saturday afternoon. The meet was held with model aeroplanes constructed by the Scouts who exhibited them.

The judges were E. F. Folsom, chairman; C. E. Williams and F. O. Belzer, and the assisting scoutmasters were H. H. Hanna, Jr., George W. Price, Irving Williams and H. E. Hayward.

In addition to the boys who won places, those entered were: Edson Folsom, Roy Schoen, Hall Marmon, James Hoster, Paul Stanley and James Mannix.

A Three-cylinder Radial Compressed Air Motor of English Design



A Monoplane Glider Constructed and Flown by C. W. Meyer of the Aero Science Club

A Dunne Type Model Aeroplane

(*Continued from page 232*)

When the cutting has been completed, run a stiff piece of wire through the hole in the center and whirl the propeller gently to see if it has the correct balance. If one blade is heavier than the other, the extra weight can be removed by cutting the blade thinner. After balancing, the propeller should be finished with sandpaper and given a coat of shellac. A bicycle spoke makes a good propeller shaft, and this material can also be used for the front rubber hook. Several washers or a bead should be inserted between the propeller and the propeller hanger to reduce the friction.

This model requires about as much rubber as the average 3-foot flyer, about 2 or 2½ inches being sufficient. This rubber may be purchased from a model supply house, or rubber bands can be purchased from a stationery store for this part of the machine. Good, new stock should be obtained to get all the spring possible.

In flying this model, it is well not to wind the propeller up too far for the first few trials until the one flying the model becomes accustomed to starting it. For the first trial the propeller should be given about 300 turns. After winding, hold the propeller from turning with the right hand and support the front of the model with the left and give it a slightly upward slant, at the same time give it a quick shove into the air and release the propeller. If the balance is right, the model will fly for a distance of about 100 feet before landing. After a little practice in launching the model, the number of turns of the rubber can be increased and longer and higher flights can be made.

The model without the rubber should weigh about 7 ounces and with the rubber ready to fly about 10 ounces. If too much rubber is added, it increases the weight of the front of the machine, giving it a tendency to dive instead of flying steadily. Ordinarily the machine was found to be a good steady flier, possessing a great amount of stability. The model was flown many times in a gusty wind and was found exceedingly stable. Even after it had been half wrecked by landing in a tree, it still flew with the same steadiness.

As this type has been little used for a model, there are many different variations which suggest themselves in making a machine of this style. It could be fitted with two propellers and double strands of rubbers, or the principle could be used on a monoplane.

FOREIGN NEWS

ARGENTINA

Buenos Ayres, Monday.—While Pierre Macho, an aviator, was making a flight to-day with a passenger his machine fell. The aviator was killed and his passenger was injured.

AUSTRIA

Vienna, Nov. 12.—An air raid on the ancient Italian city of Padua, twenty-two miles from Venice, is reported in an Austrian general headquarters' statement today.

It says:

"On Saturday night Austrian seaplanes attacked Padua (twenty-two miles from Venice) and dropped heavy bombs, making direct hits on the military headquarters building, the railway station and infantry barracks. At the barracks and in the town fires were started, which were visible twenty-five miles."

CHINA

Peking, Oct. 13.—After the army review here in celebration of the anniversary of the Chinese republic, biplanes and monoplanes of the Aerial Corps flew over the reviewing grounds, while President Li Yuan Hung stood watching the flights. Scores of photographers and moving-picture men were permitted to photograph him.

Li Yuan Hung wore the gorgeous dress uniform of a Chinese General. His long coat and trousers were light gray-blue of European cut, heavily trimmed with gold, and his breast was covered with a score of medals and decorations bestowed upon the leader who was an obscure Brigadier General in Wuchang five years ago. His helmet was surrounded by a flowing white plume.

EGYPT

Two successful air raids have been carried out by air-craft operating with the British forces in Egypt, says an official announcement of November 13. The points raided were Maghdaba and Birsaha. A ton of high explosives was dropped. Two Fokker machines were brought down by the raiding airplanes, all of which returned safely.

FRANCE

The special correspondent of the *Times* with the French army telegraphs the following description of the American squadron of the French aviation corps:

"I talked today with some of the fourteen American airmen now working with the French armies on the Somme. They arrived at their present quarters a fortnight ago from Verdun.

"Since May, when the American squadron was formed, they have accounted for twenty-two of the enemy's machines at a cost to themselves of two killed and three wounded. Five of the twenty-two were brought down by Adjutant Raoul Lufberry.

"Just after I reached their camp five of their blunt nosed Nieuports started for the front near Peronne, a journey of seven minutes, including the time taken to ascend. There was one innocent looking machine standing apart by itself which a short time before had come from Paris—more than sixty-five miles—in the incredible time of twenty-three minutes.

"Raoul Lufbery returned from a flight he had volunteered to make during the afternoon with a bullet hole through his machine, saying he believed he had forced his enemy to descend.

"Bert Hall, who has now exchanged into a French escadrille forming a part of the same group, visited the Americans' quarters and reported he had downed one.

"Dudley Hill, of Peekskill, N. Y., formerly a student at New York University; Ralph Soubiran, Willis Haviland and Didiev Masson all reported that scraps were plenty, as the German aviators were out. "You have to go to Germany to find them, however," they said.

"The only inactive members were McConnell, who is rejoining on Saturday after having been on sick leave because of rheumatism, and Lawrence Rumsey, who has been laid off by an attack of bat, an Egyptian plague of boils. William Thaw and Choteau Johnson are absent on leave, on their way to New York; Fred Prince sails on Sunday for a fortnight's leave.

"A plaster cast has been taken of the face of Norman Prince, who was killed recently, to enable a scuptor to make a bust for the family. The Government placed at the sculptor's disposal its official cinema pictures in which the American aviator appeared. These gave the artist such assistance that a lifelike result was obtained.

"The American machines now bear as the escadrille's mark the profile of a North American Indian with war feathers."

Great air battles feature the war news on the western front, where seventy-seven air combats took place between French and Prussian aviators on Thursday. Ten Prussian aeroplanes were shot down.

Paris: Saturday, Nov. 11—On Friday, three German machines were brought down by French pilots in the region of the Somme. Two of these were brought down by Lieutenant Guynermer. This brings up to twenty-one the number of machines destroyed thus far by this lieutenant.

"Two other German machines, attacked by our aircraft, went crashing to the ground; the first in Champagne, north of Auberive, and the second in Lorraine, south of Frest, Germany, where it fell in flames.

"On Thursday our bombing squadrons dropped 2,205 kilograms of explosives on enemy railway stations, bivouacs and assembling places on the Somme front.

"One of our machines flew over the Rhine between Neubreisach and Strassburg, and dropped six bombs on the railway station at Ofenburg, which was damaged seriously."

"Between 10 and 11 o'clock on the morning of November 10 a group of seventen British airplanes bombarded the steel works at Focklingen. (See British report.)

"On the following night, between 8 and 9 o'clock, eight of our airplanes executed a fresh bombardment of these works, dropping 1,800 kilograms of projectiles. Several fires were observed. All our machines returned safely.

Stations Are Attacked

"During the night of November 10-11 our squadrons drenched with projectiles the stations of Ham, St. Quentin, Tergnier and Nesle, in the Somme region, and the airdrome at Dreuze, the blast furnaces of Ramsbach, the airplane sheds of Frescati (near Metz) and the blast furnaces of Hagondange (north of Metz). These operations caused great damage, and several explosions and fires were observed.

"A German airplane during the night of November 10-11 bombarded several French towns. Nancy and Luneville received projectiles which caused damage or casualties. The open town of Amiens was also bombarded on various occasions during the same night. Nine persons of the civilian population were killed and twenty-seven injured."

GERMANY

That ten great airships of the Zeppelin type are in course of construction by the German Government for the handling of mails and other important matter between that country and the United States and will be put in commission at no distant date is the announcement of Mrs. William Malchow of Isle of Hope, who has just returned to the United States from Germany.

A Berlin Admiralty report says:

"On the night of November 9 and 10 hostile airplanes dropped bombs without success on Ostend and Zeebrugge (Belgium). One British machine was forced down and captured, and the aviator, a British officer, was made prisoner.

"A German battle plane attacked two British biplanes between Nieuport and Dunkirk. It shot down one and forced the other to retreat. Three of our battle planes met a superior British aerial squadron off Ostend and attacked it immediately. After a combat the enemy was forced to withdraw. Our machines returned to their base, having suffered insignificant damages."

The German Government has expressed regret for the action of a German airship in cruising over Dutch territory Oct. 22, says a Reuter dispatch from The Hague. The note, according to the correspondent, said that owing to a defect in the motor and the steering gear the commander was compelled to throw out two benzine reservoirs when he thought he was over Belgium.

An Amsterdam dispatch Oct. 23 said a Zeppelin the previous day had dropped a bomb near Gorkum, twenty-two miles southeast of Rotterdam. A London dispatch Oct. 27 said the Dutch Government had protested to Berlin against the violation of Holland's neutrality by the Zeppelin.

Clear weather favored aerial and artillery activity on both sides.

Saturday nine inhabitants of districts occupied by us fell victims of bomb attacks by hostile airmen upon towns behind our front. The military damage done was insignificant.

Adjutant Bonnefoy brought down on November 4 his fifth German aeroplane.

Baron Lucas, of Crudwell, a member of the Royal Flying Corps and formerly Parliamentary Under Secretary of State for War, either has been captured by the Germans or killed, according to *The Evening Star*. Lord Lucas was reconnoitering over the German lines in France, the newspaper says, and was obliged to descend behind the German lines, owing to a gale.

Lord Lucas, in 1908-'11 was Parliamentary Under Secretary of State for War and a member of the Army Council. He was appointed Under Secretary of State for the Colonies in 1911 and Parliamentary Secretary of the Board of Agriculture and Fisheries in October, 1911, becoming president of that board in 1914.

A squadron of seventeen machines bombarded the steel works at Volkingen, northwest of Saarbrücken, in Rhenish Prussia, hurling a ton of projectiles on the buildings, which were seriously damaged. The British fliers fought several battles with enemy machines, three of which were shot down.

Attack Is Repeated

Last night the attack on the Volkingen works was repeated by eight Allied aeroplanes, which threw down nearly two more tons of shells. The same night scores of stations, aerodromes, blast furnaces and airship sheds were drenched with projectiles from British aircraft, inflicting enormous damage. German airmen replied with attacks on Amiens, Nancy and Luneville.

There were many battles in the air during the last two days, in the course of which the Germans claim to have brought down ten machines, while the Allies winged nine.

One French aviator carried out a successful raid on the Rhine district from Neubreisach to Strassburg, dropping six bombs on the railroad station at Ofenburg and doing considerable damage. To accomplish this feat the flier traveled 300 miles over hostile territory. He dropped shells on points within a fifty-mile radius.

The British Admiralty issued the following statement: "In the air attack on Ostend and Zeebrugge one airplane was lost and the others returned. An official statement issued at Berlin states that the lost aviator has been captured." The War Office announces the destruction of four German machines and the loss of one British aero. Great damage was done to German communications, two trains being hit by bombs and a third set on fire.

ITALY

Milan, Nov. 10—The British world record for lofty aeroplane flight, held since April 26 last, when Harry G. Hawker reached 23,500 feet, was beaten yesterday at the Mirafiore military aerodrome in Turin when Lieutenant Guido Guidi attained a height of 25,800 feet in a flight which occupied one hour and fifty-seven minutes.

After ascending 19,750 feet Guidi's thermometer registered 89 degrees below zero. His record was officially verified both by the military commandant and the Italian Automobile Club.

The greatest height previously attained by any aviator was 25,756 feet by Heinrich, a German aviator, in 1914. This feat, however, according to available data, was not recognized by the Royal Aero Club, owing to a difference in the readings of the barographs. In 1915 Hawker made a new British altitude record by ascending 20,000 feet, the previous record having been 14,500 feet.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Greatest Aeroplane Race Ever Held

We announce this week what seems to us to be the most stupendous announcement which was ever issued by any one, anywhere, at any time. We ask you to get ready for a shock. The Aeronitis Column of Aerial Age has decided to conduct the greatest aeroplane race ever held. We have been working in secret for eight months and our plans are now ready. During all the eight months while various people were offering thousands of dollars for races, we have been biding our time, and now—and now we are ready. Nothing will be spared (except expense) to make this in all respects a monument to our patriotism, generosity, and sense of humor. The race will be open to all—any one who has the entrance fee of one thousand dollars may compete. (So it is readily seen that although this contest will be an open one it will be exclusive.) The race will be over a twelve-sided course of one hundred Irish miles (one thousand American miles).

Before making this announcement we communicated with the various rulers of the European countries and we present for our reader's edification their answers. They follow:

"Will have Captain Boelke and eight of the best pilots in the German Empire present, will stop the war for a while, if necessary. (Signed) Kaiser Wilhelm."

"Will try to be there in person, to start the race (and take a few pot shots at the Kaiser). (Signed) King George of Great Britain."

"Immense gratification at race. Posilutely appear with new machines. Banzai! (Signed) Hashimura Togo."

"Congratulations. (Signed) Harry Thaw."

"Ditto. The Flap-jack of India."

It is easily seen by the foregoing that our race will be a success. We now give a list of prizes to be awarded. We will make no further comment,—they are beautiful.

First Prize—A beautiful cup, designed by Senator J. A. Oszk, and modelled by an expert steamfitter. This cup will combine great strength, great lightness, and immense carrying capacity for fuel. In fact we guarantee that this cup will hold as much as any cup the same size ever designed.

Second Prize—An elegant celluloid shoe-horn with a hole in one end, making it easy to hang up. (Optional choice, a solid iron collar-button, with the winner's name engraved on the back.)

Third Prize—A photograph of Kaiser Wilhelm, holding the dove of peace. (Presented by King Albert of Belgium.)

Fourth Prize—A photograph of President Wilson and Colonel Roosevelt shaking hands. (Very rare.)

Fifth Prize—An ancient Roman coin with the inscription *E Pluribus Unum.* (Very valuable.)

The race will be held the fifth Saturday in September, 1962 (the 100th anniversary of the Civil War).

We invite letters announcing entries.

To An Aeroplane

O man-made bird, to thee I sing,
The sullen clouds caress thy wing,
And the velvet winds from each taut wire
Draw a note in the chord of a heavenly lyre.
I love to hear thy chuckling voice—
It bids me live; in life rejoice,
Earthly joys from my heart thou erase
As I soar to the sky with thy breath on my face.

L. V. S.

Although she really knew him well
She always called him Mr.
That is, she always did until
The second time he Kr.
And when she tried to learn to fly,
He really did ASr,
And then one day she went away
My Goodness how he Mr.!

Technical Department

Not to let any one get ahead of us, we have decided to start a technical department and answer any question which our readers may ask us. We were exposed to a good education, part of which took, and therefore we feel quite qualified to start this department. The only rules we make are as follows: Questions must be written in green ink, on both sides of the paper and addressed to the "Aeronitis Department of Aerial Age." We will answer all questions absolutely free of charge provided that a fee of one dollar accompanies each letter. We present the first batch of answers, thinking that our readers may be interested.

L. O. J.—Yes.
M. N. B.—No.
K. H. F.—Certainly.
U. I. P.—Depends upon the size of the pilot's shoes.
O. P. J.—Generally not.
Y. U. D.—In a biplane, yes, but not in a spherical balloon.
Y. B. S.—The latter is usually the case but more often the former.
P. R. S.—Your dollar was missing.

HE—Guess Jack's coming down, his engine's missing.
SHE—Isn't he the thoughtless thing! He'd lose his head if it wasn't tied on!

THE BOY AND THE AERIAL AGE

By HENRY WOODHOUSE

Specially written for the AMERICAN BOY

I HAVE been asked to tell the American boys something of the future of aviation and a boy's opportunities therein. The aerial age is just dawning, and there is a great chance for the young man who will prepare himself as an aviator or a builder of aeroplanes, or for any of the developments that will take place as a result of the rapid development of aeronautics.

The great war has given a tremendous impetus to aviation, and when the war closes we shall find that the aeroplane will take its place as an important factor in commerce. The world of aviation is just now bending all its efforts to producing bigger, better, faster, surer machines, both for military scouting and for bomb dropping. America is far behind in aviation and we have just begun to awaken. To develop our aeroplanes and to train aviators, to make us safe from attack in war and to enable us to meet competition in transportation in time of peace, is a task and an opportunity for you American boys.

Aeroplanes are rapidly growing in size and speed. In 1914, before the war broke out, the carrying capacity of the average aeroplane was about a ton. By 1915 this had been increased to two tons. Now aeroplanes are being constructed to lift fifteen tons, and which are undoubtedly capable of flying across the Atlantic. What the next five years will bring forth no one can anticipate, but after witnessing the tremendous development that has taken place in the past three years, we cannot but admit that the next five years will see the advent of the aerial age—the employment of aircraft for general utilitarian purposes. You probably can all expect to live to see not only the mails but passengers and express quite generally carried by aeroplane, in safety and at a speed at present quite unattainable. Considering the great changes in ways of living and doing business which have been brought about the coming of fast transportation on land and on water, may we not expect even greater changes as a result of the advent of the aerial age?

Whereas the automobile, the railroad, the ship must halt before obstacles and progress is limited to over land in the first instance and over water in the second, progress of the aircraft is unhindered and unlimited. Human flight has opened the sky to men, giving a new road in which to travel. Because it is a road free of all obstructions and leads everywhere, affording the shortest possible distance to every other place, it offers to man, in its prospective developed stage, unlimited freedom. Scanning continents, like railroads, bridging seas like ships, going over mountains, forests and all physical obstructions like the bird, the aircraft brings the elimination of frontiers and the physical connection of nations.

Young men who are now fitting themselves for active life are men who will live in this new age, and they have much to give and much to receive from it. Through the tremendous strides forward of aeronautics there are wonderful possibilities for the employment of ingenuity, genius and skill, and business opportunities as great as have ever been created by progress in important lines of human endeavor.

There are problems of engineering to be faced as huge as were solved by Goethals and other master builders. There are problems of transportation to be solved by the application of aircraft as wonderful as any economist could wish, and possibilities for the development of international relations greater than were ever conceived. The opportunities to gain distinction offered by aviation are wide enough to satisfy the most ambitious young man.

You boys should not forget that the Wrights started their studies in aviation with models. They learned to make and fly models first, and what they there learned enabled them to make and fly a man-carrying machine. You can learn much from your models and you should study them carefully. If you can construct and fly models that will fly far or high, or fast or long as you wish, you will have taken a long first step towards becoming an aviator or an aeronautical engineer.

A thorough engineering course lies at the basis of a broad success in aviation, and if you would design and build the aeroplanes of the future, pursue your engineering studies as far as possible. The universities are just beginning to establish courses in aeronautics. It is to be hoped and expected that these will be extended and improved. If you would be a leader in the aerial age which lies just before us, work with your models now and when the time comes, take your place with the fliers and in the university, in military organizations, or in business. Remember that this is a new line of human endeavor and you have an opportunity to be a pioneer!

Curtiss

JN TWIN MOTORED TRACTOR

FLIES AND CLIMBS ON ONE MOTOR

A DOUBLE FACTOR OF SAFETY

Against Any Possible Forced Landing Is Gained by This Machine in Its Ability to Climb on One Motor

Recently piloted by Victor Carlstrom 661 miles, when equipped with pontoons, in 8½ hours in flights for the Curtiss Marine Trophy, making greatest mileage for this contest so far recorded.

THE CURTISS AEROPLANE CO.

BUFFALO, N. Y.

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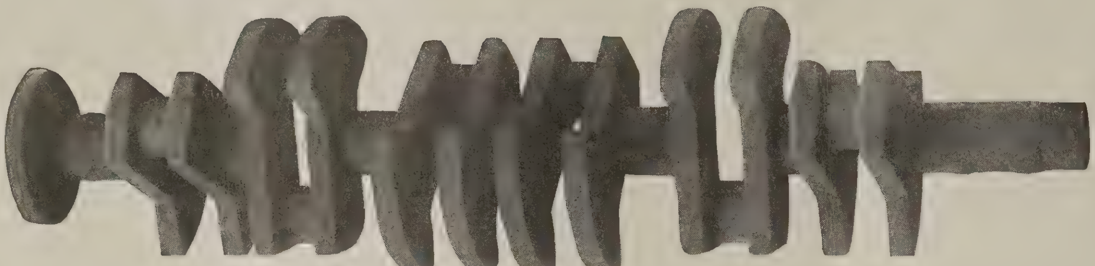
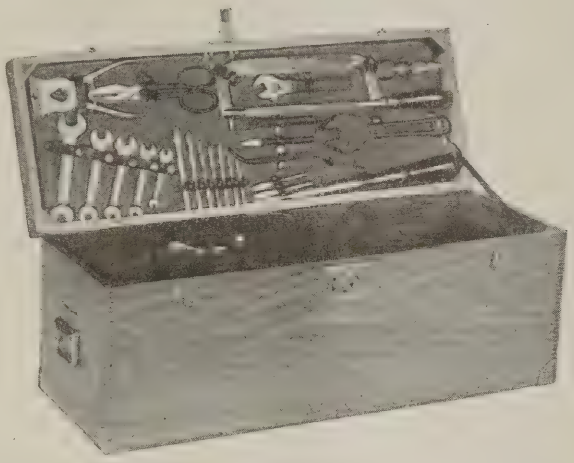


PARK DROP FORGE COMPANY, Cleveland, Ohio



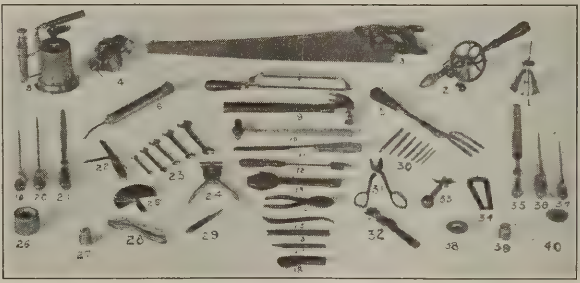
A Pilot's Necessity

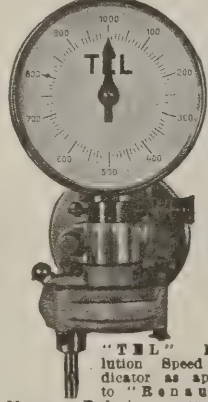
THE accompanying illustrations show the compactness and completeness of the Cooper Aëronautical Tool Box. Complete with the assortment of tools shown on the lower diagram the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

After five years of flying experience these tools have been selected to meet every requirement for Aeroplane service. The size of the box is 28 x 9 x 10 inches.

Single Boxes, $100 — Discount on Quantity

The John D. Cooper Aeroplane Co.
BRIDGEPORT, CONN., U. S. A.





"TEL" Revolution Speed Indicator as applied to "Renault" Motor. Reducing gear-box attached to foot of instrument

"TEL" INSTRUMENTS

for indicating and recording the number of revolutions per minute of the propeller attached to

AEROPLANES AND DIRIGIBLES

Over 2,000 supplied during the last 18 months to the Naval and Military authorities of Great Britain, France, Russia, Italy and Spain

"Tel" instruments are of conjugate movement, the pointer being in direct mechanical connection with the driving shaft of the engine.

HASLER TELEGRAPH WORKS
26 VICTORIA ST., WESTMINSTER
LONDON, S. W., ENGLAND

TEL" Revolution Speed Indicator as applied to "Gnome" Motor. Separate reducing gear-box attached oil pump of motor.

(Continued from page 253)

shaft is tapered to take the propeller hub which it drives by four heavy jaws integral with itself. The propeller hub is drawn on to this shaft by means of a nut turning right hand and is locked by a plug turning left hand. The propeller hub with its inside flange is in one piece incorporating the jaws to engage the jaws on the shaft proper. The propeller hub is splined on the outboard end to take the splined flange, thus giving an allowable thickness of propeller of from 5 to 9 inches. Eight ⅝ inch bolts pass through both flanges on the propeller to clamp it in place. The propeller shaft as well as the crankshaft at this end is heavily splined to take the propeller gears and, in fact, splines are used throughout the motor where there is the slightest doubt the advisability of a key. The preliminary test was carried out with a ratio allowing propeller speed of 1,140 with the motor at 1,600 r.p.m.

The water pump is of the double impeller type with water on each side of the impeller thus avoiding thrust. It is in one assembly and is driven by a flexible coupling at the end of the crankshaft so that it is readily detachable by the removal of four bolts which hold it to the gearcase cover. This pump has one intake with two discharge pipes. These pipes lead to brass tapered tubes extending along the outside of the motor on each side, supplying the cylinder blocks with water at two points each. The water rises through the cylinder jackets, passing directly into the cylinder heads through registering holes, and flows out at either end of the heads which may be desired.

Electric starting motor and lighting generator are provided and built into the motor and the motor is started by simply pressing a starting button to throw the switch.

The ignition is of the type wherein the current is furnished by battery for starting and generator for running. One spark plug is used per cylinder. A pull handle is provided on each side of the motor to operate all six priming cocks at once on either side.

A tachometer is provided and driven from one end of the camshaft and it indicates the propeller speed from 500 to 1,500 r.p.m.

Double Zenith carburetors are used on each side of the motor, thus using a separate carburetor for each three cylinders. These carburetors are of special design and provide for extra air adjustment at high altitude.

The horizontal shaft projects through the gearcase cover providing for a pulley to drive wireless generator.

The air pump is of the two-cycle type of liberal dimension and supplies air pressure to the gasoline tank from 4 to 7 lbs. An adjustable regulator is attached.

The weight of the motor complete with starting and lighting tachometer, ignition equipment and exhaust pipes is 1,400 lbs. This includes everything but the propeller hub, which is part of the propeller assembly, although furnished with the motor. The weight of this propeller hub is 23 lbs.

(Continued from page 251)

vertically below the region of the center of aeroplane lift and termination rearwardly in a transverse edge extending across said base ond constituting substantially the lowermost portion of said surface, said base projecting a considerable distance in front of the region of aeroplane lift such that the said edge is nearer said region than is the front of said base, elevating controls located longitudinally distant from and above said edge, means to steer said machine in air, and aerial driving means exerting its thrust substantially horizontally and materially above said base.

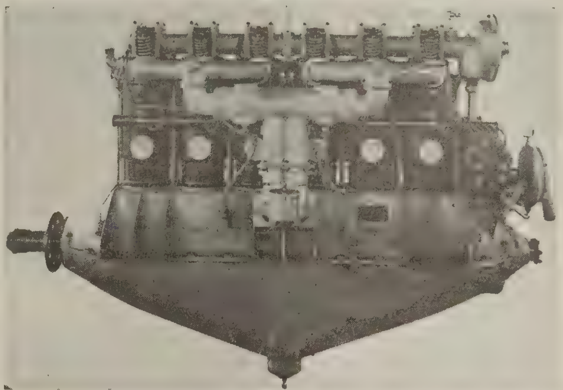
2. A hydroaeroplane comprising aeroplane wings, a longitudinally continuous water-borne base therefor having a hydroplane bottom making a small positive angle with said wings and terminating rearwardly in a transverse edge constituting substantially the lowermost position of said surface and terminating laterally in abruptly turned chine edges, said base projecting a considerable distance in front of the region of the center of aeroplane lift such that the said edge is nearer the region of aroplane lift than is the front of said base, elevating controls located longitudinally distant from the above said edge, and aerial driving means exerting its thrust on a horizontal line materially above said base.

3. A hydroaeroplane comprising aeroplane wings, a longitudinally continuous water-borne base therefor having a hydroplaning bottom terminating rearwardly in a transverse edge located in the rear of the center of gravity of the machine as a whole and terminating laterally in abruptly turned chine edges, said base projecting a considerable distance in front of the region of the center of aeroplane lift such that the said edge is nearer to the region of aeroplane lift than is the front of the base, and said base having a transversely broad downwardly and rearwardly extending landing prow, elevating controls located longitudinally distant from above and above said edge, and aerial driving means exerting thrust on a substantially horizontal line above said base.

4. A hydroaeroplane comprising aeroplane wings, aerial driving means, a longitudinally continuous water-borne base therefor having a hydroplaning surface therebeneath and terminating in an edge, elevating and steering controls located longitudinally distant from and above said edge and forming with said hydrosurface and edge, an angle of substantial saliency of which the edge constitutes the apex, said base being of sufficient length to give substantial longitudinal stability both when standing and when operating at speed upon the water, yet freely rockable through manipulation of said elevating controls, and said wings making a small positive angle with said hydrosurface whereby the wings are maintained at a flying angle of incidence while the craft is operating at speed on the surface of the water and said flying angle of incidence may be varied.

5. A hydroaeroplane comprising aeroplane wings, an aerial driving means, a longitudinally continuous water-borne base therefor having a hydroplaning surface therebeneath terminating in a transverse edge and the major portion of the area of which lies in advance of the region of aeroplane lift, elevating and steering controls located aft of, distant from and above said edge and forming with said hydroplaning surface and edge, an angle of substantial saliency, said base being of sufficient length to give substantial longitudinal stability both when standing and when operating at speed upon the water, yet freely rockable through manipulation of said elevating controls, said base being free of material water resistant surfaces after of the terminus of said hydroplaning area and said wings making a small positive angle with said hydroplaning sur-

Hall-Scott Aviation Motors



Constructors of aeroplanes cannot afford to select a power plant not possessing those refinements in design and construction which can only be obtained by manufacturers doing business on a large, steady production basis.

THE HALL-SCOTT AEROPLANE MOTOR FACTORY is producing at the present time more aviation motors per week than any three other manufacturers in the United States.

Such a production (which it is expected will not only continue, but greatly increase during the next two years), allows the use of three hundred skilled mechanics, each trained to do his individual part in the manufacturing, assembling and testing of Hall-Scott motors. It permits of systematizing to such an extent that each individual part may be subjected to a careful and rigid inspection after every operation through which it goes before completion. An elaborate and expensive testing department can be provided under such a production, whereby the complete power plants are given a most thorough and exhaustive test by Hall-Scott testers. These tests are witnessed, however, by expert engineers not connected with our company in any way. This insures each prospective purchaser that they will obtain a power plant that is up to Hall-Scott standard. A large experimental room is kept extremely busy with skilled engineers using their best efforts to perfect and improve our present motors. Other types are being assembled and tested by this department in order that the high standard set by Hall-Scott power plants today will continue to be upheld in the future.

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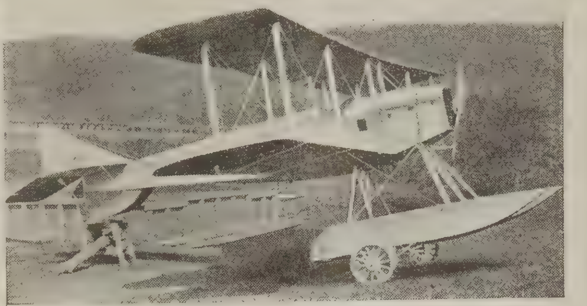

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face whereby the wings are maintained at a flying angle of incidence while the craft is operating at speed over the surface of the water and said flying angle of incidence may be freely varied.

6. A hydroaeroplane comprising aeroplane wings, a longitudinally continuous water-borne base therefor having a hydroplaning area therebeneath termination in an edge and the major portion of which lies in advance of the region of aeroplane lift, an aerial driving means therefor exerting a driving thrust on a horizontal line above said hydroplaning surface, elevating and steering controls located longitudinally distant from and above said edge and forming with said hydrosurface and edge, an angle of substantial saliency of which the edge constitutes the apex, said base being of sufficient length to give substantial longitudinal stability both when standing and when operating at speed upon the water, yet freely rockable through manipulation of said elevating controls, and said wings making a small positive angle with said hydrosurface whereby the wings are maintained at a flying angle of incidence while the craft is operating at a speed on the surface of the water and said flying angle of incidence may be varied.

7. A hydroaeroplane comprising aeroplane wings, aerial driving means, a longitudinally continuous water-borne base therefor having a hydroplaning surface therebeneath terminating in an edge, said hydroplaning surface having a broad downwardly and rearwardly inclined area at the frontal portion thereof in advance of said wings, a substantially horizontally extending area beneath the resultant center of lift of said wings, and a transversely extending edge rearward of said latter area, elevating and steering controls located longitudinally distant from and above said edge and forming with said hydrosurface and edge, an angle of substantial saliency of which the edge constitutes the apex, said base being of sufficient length to give substantial longitudinal stability both when standing and when operating at speed upon the water, yet freely rockable through manipulation of said elevating controls, and said wings making a small positive angle with said hydrosurface whereby the wings are maintained at a flying angle of incidence while the craft is operating at speed on the surface of the water and said flying angle of incidence may be varied.

8. A hydroaeroplane comprising aeroplane wings, aerial driving means, a longitudinally continuous water-borne base therefor having a hydroplaning surface therebeneath terminating in an edge, the center of hydroplaning lift of which surface when the craft is operated at speed upon the water lies in the vicinity of the vertical projection of the region of the resultant center of lift of said aeroplane wings, elevating and steering controls located longitudinally distant from and above said edge and forming with said hydrosurface and edge, an angle of substantial saliency of which the edge constitutes the apex, said base being of sufficient length to give substantial longitudinal stability both when standing and when operating at speed upon the water, yet freely rockable through manipulation of said elevating controls, and said wings making a small positive angle with said hydrosurface whereby the wings are maintained at a flying angle of incidence while the craft is operating at speed on the surface of the water and said flying angle of incidence may be varied.

9. A hydroaeroplane comprising aeroplane wings, aerial driving means, a longitudinally continuous water-borne base therefor having a hydroplaning surface therebeneath terminating in an edge, the center of hydroplaning lift of which surface whent the craft is operated at speed upon the water lies in the vicinity of the vertical projection of the resultant center of lift of said aeroplane wings but slightly in advance of the same, elevating and steering controls located longitudinally distant from and above said edge and forming with said hydrosurface and edge, an angle of substantial saliency of which the edge constitutes the apex, said base being of sufficient length to give substantial longitudinal stability both when standing and when operating at speed upon the water, yet freely rockable through manipulation of said elevating controls, and said wing making a small positive angle with said hydrosurface whereby the wings are maintained at a flying angle of incidence while the craft is operating at speed on the surface of the water and said flying angle of incidence may be varied.

10. A hydroaeroplane comprising aeroplane wings, a longitudinally continuous water-borne base therefor having a hydroplaning surface therebeneath projecting considerably in advance of said wings and having a downwardly and rearwardly inclined broad frontal portion, and a broad laterally extended portion extending more horizontally and rearwardly terminating in an edge located aft of said wings, the center of hydroplaning lift of which surface when the craft is operated- at speed upon the water lying in the vicinity of the vertical projection of the region of the resultant center of lift of said aeroplane wings, but somewhat in advance of the same, aerial driving means having a line of driving thrust located materially above said waterbone base, elevating and steering controls located aft of, distant from and above said edge and forming with said hydroplaning surface and edge, an angle of a substantial saliency of which the edge constitutes the apex, said base and hydroplaning surface being of sufficient length to give substantial longitudinal stability both when standing and when operating at speed upon the water, yet free of material water resistant surfaces aft of said terminal edge of the hydroplaning surface and freely rockable through manipulation of said elevating controls, and said wings making a small positive angle with said hydroplaning surface whereby the wings are maintained at a flying angle of incidence while the craft is operating at speed over the surface of the water and said flying angle of incidence may be freely varied.

11. A hydroaeroplane comprising aeroplane wings, aerial driving means, a longitudinally continuous water-borne base therefor having a hydroplaning surface therebeneath terminating rearwardly in an edge constituting substantially the lowermost portion of said surface and said base having a transversely broad downwardly and rearwardly inclined landing prow, and elevating and steering controls located longitudinally distant from and above said edge and forming with said hydrosurface and edge an angle of substantial saliency of which the edge constitutes the apex, said base being of sufficient length to give substantial longitudinal stability both when standing and when operating at speed upon the water, yet freely rockable through manipulation of said elevating controls, whereby the angle of incidence of said wings may be varied.

12. A hydroaeroplane comprising aeroplane wings, aerial driving means, a longitudinally continuous water-borne base therefor having a hydroplaning surface therebeneath terminating rearwardly in an edge constituting substantially the lowermost portion of said sur-

SP

AEROPLANE VALVES

No other valve carries such great responsibility — no other valve requires for its production such specialized skill and such thorough knowledge of steels.

The Steel Products Co., have made more valves for more different motors than any manufacturers in the world. They have been particularly successful in making valves for aeroplane motors.

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face the center of hydroplaning lift of which surface when the craft is operated at speed upon the water lies in the vicinity of the vertical projection of the resultant center of lift of said aeroplane wings but in advance of the same, elevating and steering controls located longitudinally distant from and above said edge and forming with said hydrosurface and edge an angle of substantial saliency of which the edge constitutes the apex, said base having a transversely broad downwardly and rearwardly inclined landing prow and being of sufficient length to give substantial longitudinal stability both when standing and when operating upon the water, yet freely rockable through manipulation of said elevating controls when the machine is at speed, whereby the angle of incidence of wings may be varied.

In testimony whereof I affix my signature.

GLENN H. CURTISS.

(Continued from page 257)

2. The combination with a boat of the class described, of an external false bottom member of U-shape in cross-section pivoted near the forward end of the boat and extending rearwardly approximately to a point below the center of gravity of the whole apparatus, and means for at will adjusting the distance of the rear end of the false bottom from the body of the boat.

3. The combination with a boat of the class described having a flat bottom primarily without step or offset, of an external false bottom pivoted to the forward end of the boat, approximately following the true bottom to a point amidships and provided on each side with a flange extending upward alongside the corresponding boat wall, and means for at will adjusting the false bottom about its pivotal axis.

4. The combination with a boat of the class described, of an external false bottom pivoted to the forward end of the boat and extending rearwardly approximately to a point below the center of gravity of the whole apparatus, and means for at will adjusting equally and simultaneously the distances of the sides of the false bottom at their rear ends from the body of the boat.

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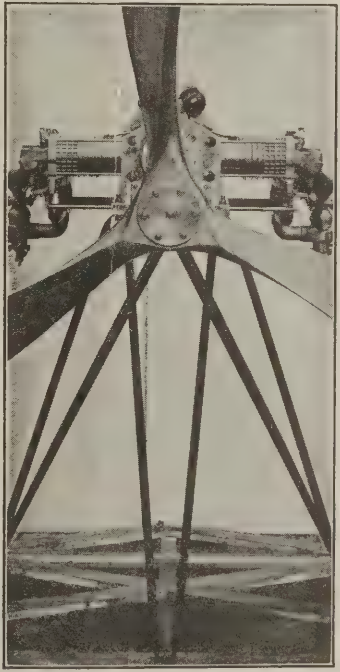

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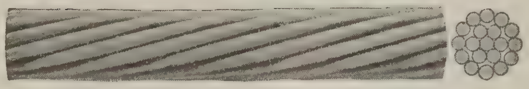
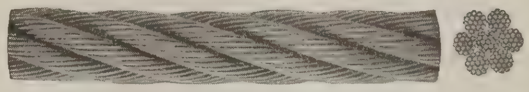


Roebling 19 Wire Strand



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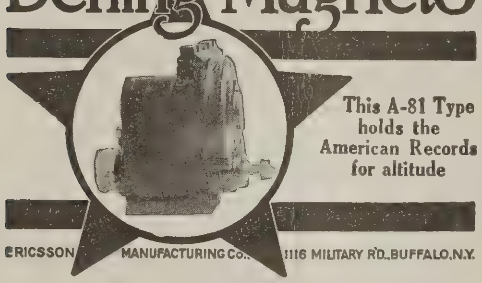
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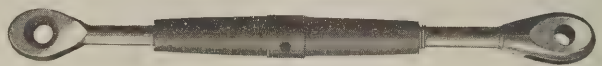

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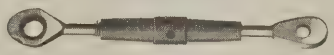

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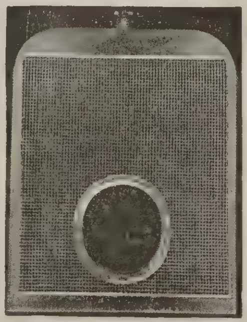

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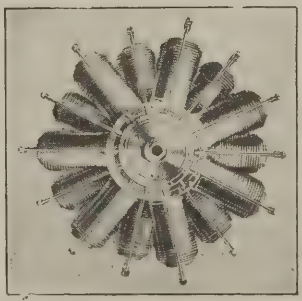

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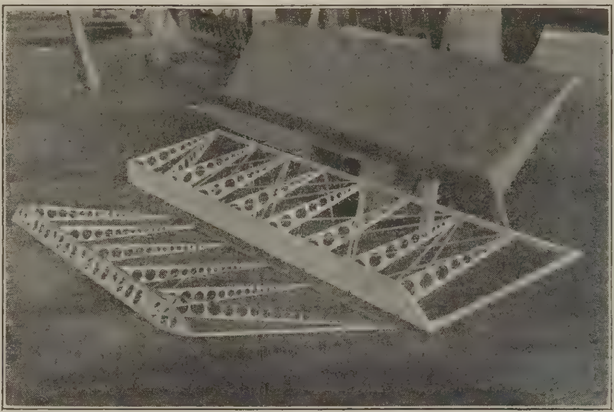

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THE FIRST
PAN-AMERICAN AERONAUTIC EXPOSITION

Grand Central Palace, New York,
February 8th to 15th, 1917

TO FOLLOW THE AUTOMOBILE AND MOTOR BOAT SHOWS

Held Under the Auspices of

The Aero Club of America
The Pan-American Aeronautic Federation
The American Society of Aeronautic Engineers

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> Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

APPLICATIONS FOR SPACE SHOULD BE ADDRESSED TO

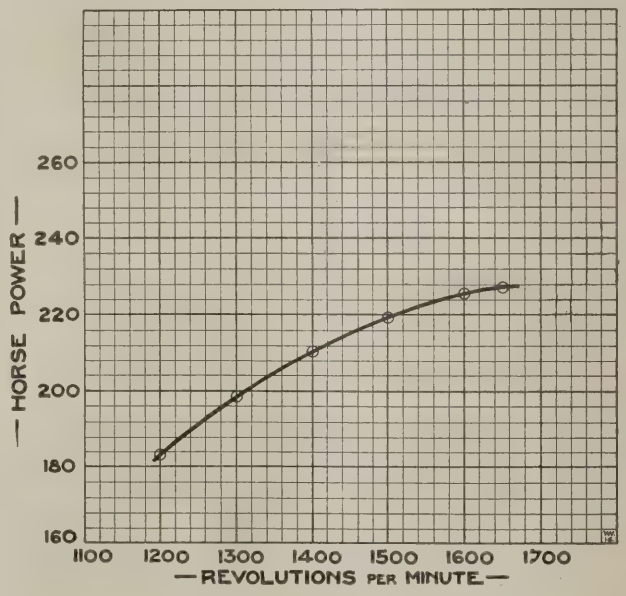
HOWARD E. COFFIN

CHAIRMAN, ORGANIZING COMMITTEE

Pan-American Aeronautic Exposition
297 Madison Avenue, New York

MODEL VX-3 motor was used by Victor Carlstrom on November 2nd in establishing the new American Cross-Country record, flying from Chicago to Erie, Penna., a distance of 452 miles, in 3 hours 57 minutes.

Owing to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed Horse Power	210.50
Minimum Observed Horse Power	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

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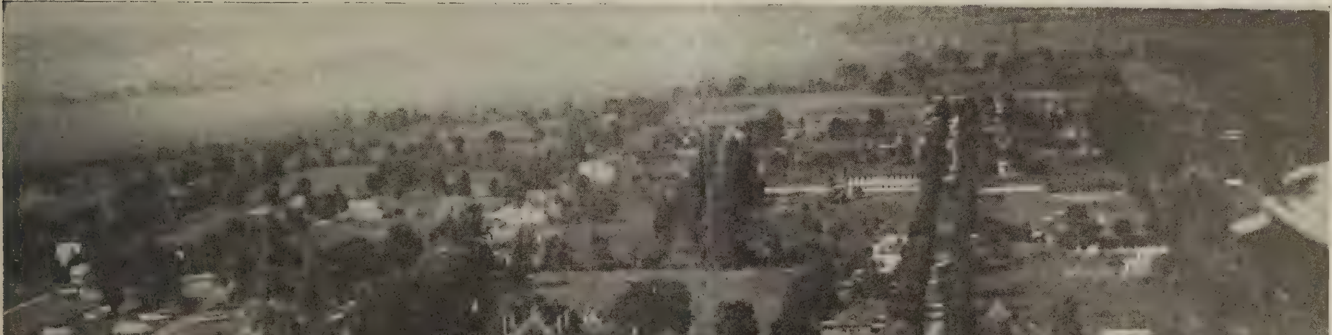
AERIAL AGE
WEEKLY

VOL. 4, No. 11 NOVEMBER 27, 1916 10 CENTS A COPY



The flying grounds of the Philadelphia Aviation School at Essington, photographed from one of the school machines. The school was organized by Mr. Robert Glendinning, the Philadelphia banker, and during the past season thirty-two students received instructions. Three of the flying boats will be seen on shore by the hangars, and one going out.

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Eastern flying field
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Hydroaeroplane station
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AERIAL AGE
WEEKLY

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VOL. IV NEW YORK, NOVEMBER 27, 1916 No. 11

MISS RUTH LAW NOW HOLDS AMERICAN NON-STOP CROSS-COUNTRY RECORD, AND WORLD CROSS-COUNTRY RECORD FOR WOMEN

THE American non-stop cross country record, the world record for women and the second best world cross country non-stop record are now held by Miss Ruth Bancroft Law, who flew from Chicago to New York on November 19-20.

She left Chicago on Sunday morning at 8:25 a. m., Eastern time, cheered by the people who had gathered at Grant Park, and her aeroplane, being loaded to its fullest capacity, climbed sluggishly and battled with the varying wind currents which came across and over the buildings on the lake front. There was at the time a southwest wind of about 26 miles an hour which soon died out and there was almost no wind thereafter. She had mapped her course and had her chart mounted on rollers in a case, the case being strapped to her belt and to the guard of the seat. She had gone over the course to be followed with Lieut. J. A. McAleer, of the Hydrographic Survey Office of Chicago, and then had traced the route herself on the chart, noting on the chart the compass directions of her flight, which directions she summarized on the cuff of the gauntlet. These notations read as follows: Gary, 227 miles, S. 88° E.; Port Clinton, 21 miles, S. 69° E.; Huron, 44½ miles, N. 81° E.; Cleveland, 95 miles, N. 63° E.; Erie, 83½ miles, S. 84° E.; Olean, 44 miles, N. 72° E.; Hornell, 48 miles, S. 60° E.: Elmira, 45 miles, S. 81° E.; Binghamton, 81 miles, S. 42° E.; Port Jervis, 33 miles, S. 50° E.; Suffern, 32 miles, South to New York.

Following her directions, she passed Cleveland, flying at a height of about 6,000 feet, and went on and passed Erie at a height of 3,000 feet. She soon passed Olean and flew to Hornell, New York, where she landed at 2:10 p. m., having covered the distance of 590 miles, breaking the American cross-country non-stop record made by Victor Carlstrom on November 2nd, bettering Victor Carlstrom's non-stop distance record from Chicago to Erie by 138 miles. She left Hornell at 3:24 p. m. and flew to Binghamton, 90 miles away, where she arrived at 4.20 p. m.

She passed the night at Binghamton and started again on her flight to New York Monday morning at 7:23. It was foggy when she started from Binghamton and all the way to New York she had to fly at a height varying from 500 to 2,500 feet, coming lower from time to time to get out of the low-lying clouds. The distance from Binghamton to New York is 152 miles in a straight line and about twenty miles more by the way Miss Law followed. She covered this distance in two hours and 14 minutes and 35 seconds.

Miss Ruth Law

Miss Law arrived at Governor's Island at 9:37:35, and was met by Army and Aero Club authorities, including Major General Leonard Wood, Major Carl F. Hartmann, Signal Corps; Alan R. Hawley, President of the Aero Club of America; Every Jansen Wendell, Henry Woodhouse and Charles Jerome Edwards, members of the Board of Governors of the Club, Augustus Post and other aeronautic authorities, including G. Douglas Wardrop, editor of AERIAL AGE, for whom Miss Law had a letter sent by Mr. A. W. Scott of Chicago, and carried by her together with other mail which included a letter addressed to David Belasco and a letter to Mr. W. J. Bemish, Secretary of the Rotary Club of New York, sent to him by Mr. James G. Bronlow, President of the Rotary Club of Binghamton.

"If the weather man had made good his promise," were Miss Law's first remarks after she had been congratulated by the Club and Army authorities, "and had supplied the gale which he predicted, I would have arrived in New York from Chicago last night. I would also have made better time from Binghamton to New York this morning."

Mr. Mitchell, the weather man at Chicago, to whom Miss Law confided her plan to fly from Chicago to New York, advised her that Sunday would be a good day on which to start and that there would probably be a wind of over fifty miles an hour. His prediction held true in so far as Chicago was concerned. She met a gale when she rose from Grant Park, Chicago, and for about twenty miles beyond Chicago. Beyond that, greatly to her disappointment, the gale subsided and she had to continue her flight, very much to her disgust, in calm, windless weather, which upset her calculation in so far as the speed which her light aeroplane could make from Chicago to New York.

After the Army and Aero Club of America authorities, and representatives of the press who were at the aviation field at Governor's Island to receive her, had congratulated her, she went to the home of Mrs. Carl F. Hartmann, on the Island, where she breakfasted and was interviewed by the press representatives.

It was a surprise to everybody to find that the aeroplane used to make this record-breaking flight was the small loop-the-loop Curtiss biplane with the propeller in the rear which she had built especially for herself on the old model last

March for the looping-the-loop exhibitions which she gave in number during the past season. She wanted this type, where the seat is in front, without protection from the elements, she said, because it affords a wider range of vision while flying. The machine was equipped with a 100 H.P. Curtiss motor and gasoline tanks holding 53 gallons. These tanks being much lower than the motor they feed the motor in the normal way until two-thirds of the gas has been consumed, after which it was necessary for Miss Law, to dip the machine from time to time to fill the carburetor.

"I reached New York just as the gasoline was getting lower than one-fourth the capacity and the feeding by dipping was getting less effective. I didn't like the idea of landing in the river, so I looked for a landing place between the buildings and was ready to land in a street, if necessary. My machine, having only a span of 28 feet, could easily land in some of the streets of New York. But Governors Island was within reach and I glided down on the Island, where I received such a cordial reception.

"It was an easy flight right through and I am ready to do it all over and make it in a single flight. But while my little machine has served the purpose in this flight, I should like to get a twin-motored battleplane for my next flight. I only used this little machine because Mr. Glenn H. Curtiss would not supply me with a twin-motored battleplane. I tried hard to convince him but I couldn't convince him that I could easily handle the two-100 horsepower motors.

"I am going to enter in the Transcontinental Aeroplane Contest which the Aero Club of America will hold next year. It is feasible in every way and will do much to develop cross country flying in this country.

"The Club is doing most practical work. Its plan to establish a chain of landing places from New York to Chicago and then across the country and the Transcontinental Aeroplane Contest are going to popularize cross country flying in America and make the aeroplane a utilitarian factor. There will soon be hundreds of people flying from Chicago to New York for business and pleasure—as soon as the chain of landing places is established."

An impromptu reception by the leading aviators and aeronautic authorities was tendered to Miss Ruth Bancroft Law at the Aero Club of America on the afternoon of her arrival. Being known that she would call at the Club at three o'clock, the aviators and leading aeronautic authorities called at the Club to congratulate her. Among those who called and those present to give her a hearty welcome and congratulate her were: Alan R. Hawley, President of the Club, Henry A. Wise Wood, Evert Jansen Wendell, Henry Woodhouse, Charles Jerome Edwards, Governors of the Club; Augustus Post, Professor David Todd, Glenn L. Martin, Vice-President, the Wright-Martin Corporation; G. Douglas Wardrop, Editor of AERIAL AGE; W. D. Judkins, Vice-President, the Standard Aero Corporation; Stuart McDonald, manager, The America Trans Oceanic Company; Victor Carlstrom, the aviator whose non-stop cross-country flying record Miss Law bettered; J. Guy Gilpatric, aviator; John D. Cooper, President of the Cooper Aeroplane Company; A. Leo Stevens, the veteran aeronaut, who is now instructor and inspector in the United States Army lighter-than-air section; W. S. Bonney, aviator; Ladislas d'Orcy, W. W. Niles, Farnum T. Fish, the aviator; George L. Larabee, George H. Guy, Arthur Johns, Edward F. Searles, and Lyman J. Seeley.

Miss Law was felicitated on her achievement and for her grit. Mr. Hawley, speaking for the officials of the Club, stated that her achievement was a fitting climax to a year of substantial developments in American aviation.

The aviators were unanimous in saying that if Miss Law made this record without previous experience in cross-country flying, they would have to watch out for their laurels during the coming year, when she would get some practice! The $20,000 prize which the Aero Club of America will offer for the Transcontinental Aeroplane Contest, they said, was very much in danger of being carried away by Miss Law!

An Air Cruiser De Luxe

THE most luxurious air cruiser ever built was inspected at Port Washington, Long Island, on November 19th, by a prominent gathering, including Judge Robert Lovett and his son, Robert A. Lovett, and F. Trubee Davison, H. P. Davison, Jr., members of Aerial Coast Patrol Unit No. 1; Alan R. Hawley, president of the Aero Club of America; Henry Woodhouse, member of the Board of Governors of the Aero Club; Lawrence B. Sperry, the inventor of the Sperry automatic pilot; W. D. Gash, personal representative of Rodman Wanamaker; T. A. Morgan, Stuart McDonald, Captain Ernest C. Bass, David H. McCulloch, and others.

The wings of this luxurious cruiser, which has been constructed for a prominent man, have a span of 76 feet, the body, from the bow to the tip of the rear rudder is 54 feet long. The body is gracefully shaped and looks like a streamline boat equipped with huge wings. Between the wings are two 100 h.p. model O X X 2 Curtiss motors, which are started with a special electric self-starter and mufflers.

This cruiser has flown with eleven people on board, but the seating arrangement is for five people, four in front and the mechanic in the rear. The seats are arranged two behind the other, with a convenient door between them. The seats are upholstered in pigskin and the entire cock-pit is in mahogany. The hull is finished in white on the sides, green below the water line, and the deck is in mahogany.

Its equipment, besides self-starter, muffler, electric lights, search-lights, the regulation lights for night flying, anchor, and other regulation equipment for yachts, includes the Sperry Automatic Pilot, which controls the air cruiser in flight, relieving the pilot of the trouble of banking, checking wind variations, and other details of operating the cruiser in flight.

Being a rough-water craft, built to start from and land on rough water, it has a cabin top to use in bad weather, which is removed in fair weather.

The air cruiser draws 18 inches of water, can leave the water in thirty seconds, has a cruising radius, fully loaded, of 300 miles without replenishing, or 500 miles with only the five passengers and no additional equipment. It is made to fly at 60 miles an hour with full load.

The visitors were all greatly impressed by the remarkable completeness of this last word in pleasure air craft, and praised Mr. William D. Gash, personal representative of Mr. Wanamaker, the head of the America Trans Oceanic Company, who is in charge of the aviation station at Port Washington.

It will be remembered that Mr. Wanamaker established this station as part of his plans to establish a transatlantic air line. This luxurious air cruiser is a step towards carrying out this plan, which was halted by the war. The next step will be a larger air cruiser—which may be the trans-Atlantic type.

Messrs. Robert A. Lovett, F. Trubee Davison, and H. P. Davison, Jr., as part of the Aerial Coast Patrol Unit No. 1, have been flying at Port Washington, training to be of utmost service for national defense. They were greatly pleased with the new air cruiser.

It is possible that this cruiser will be flown to Florida in the near future.

Volunteers for Aerial Reserve Corps Wanted

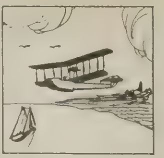
A BIG Army aviation training school is being established at Miami by the Curtiss Company for the training of the men who join the Aerial Reserve Corps. The plans show that this school will be as large as the other Army aviation school located on North Island, San Diego, which, as being developed, will have facilities for training 1,000 military aviators.

The new Army training school at Miami, while being established for the Army by private interests, is to be conducted under the direction of Army officers, and the students who will all be made men who have enlisted in the Aerial Reserve Corps, will be taught military aeronautics as well as aerodynamics, the theory and practice of aeronautics, gas engines, map-making, etc.

The plans are to make this a permanent military training school, and buildings are being set up for officers' and enlisted men's quarters, lecture halls, machine shops, experimental departments, etc. The advice received by the Aero Club of America states that while the Army has received over 1,000 applications from men who would like to join the Aerial Reserve Corps, the proportions of men having the qualifications necessary to justify making them officers after they have had a course of military aviation training are small. The Aviation Section of the Army is, therefore, anxious to have more applications from men who have had the equivalent of college education, particularly men who have attended the military training camps. The course of training and other expenses while training will be paid by the Government, and those who qualify as military aviators have a good opportunity of remaining permanently connected with the Air Service.

Applicants should address Lieut-Col. George O. Squier, officer in charge, Aviation Section, Signal Corps, Washington, D. C.

THE NEWS OF THE WEEK



Aeroplane Squad Flies to Football Game

A squadron of twelve aeroplanes flew from the Government aviation field at Mineola, L. I., to Princeton, N. J., and landed there in time for their pilots and observers to see the Yale-Princeton game. It was the first time that so many machines had flown cross-country, and their flight in battle formation was watched by thousands.

All the machines arrived before the game, although two of them had minor troubles and were forced to land and make repairs before going on.

The squadron was composed of aviators from both Governors Island and Mineola, and their flight combined the pleasure of the outing with the military tests required for cross-country work.

The flight was unofficially known as "the Football Special," and the first machine to take the air was a new one driven by Captain Raynal C. Boling. He was followed shortly after by Captain Ralph L. Taylor, of the Signal Corps. Then at one-minute intervals the other eight machines took the air. These were piloted by First Lieut. W. G. Kilner, who was in command of the squadron; Sergeant D. R. Noyes, Lieutenant James E. Miller, Sergeant W. P. Willets, Lieutenant Alexander B. Thaw, A. S. Adams, Sergeant J. H. Stevenson and H. B. Blakely.

As soon as the first few machines reached an altitude of about 1,000 feet, they circled about waiting for the others. In a short time all were flying and then Lieutenant Kilner signaled for flight formation and they strung out in line and started for Princeton.

In the meantime, "Hobey" Baker with Cord Meyer, of Yale, as passenger, and Philip A. Carroll stood by their machine at Governors Island. Observers with powerful field glasses watched the sky over Brooklyn and the minute they reported the first of the squadron, the motors on the Governors Island machines were started. A few moments later, both Baker and Carroll rose and as the squadron hung over the bay, dropped in behind.

The machines that had troubles and were forced to land were those piloted by Blakely and Thaw. Blakely was flying an L. W. F. biplane, with Private Reynolds, of the United States Aviation Section, as observer. He became separated from the squadron and lost his bearings. Before he realized where he was he found that he was approaching Atlantic City. He landed at Keyport, and, after fifteen minutes' rest, during which he inspected his machine, he again took to the air and arrived at Princeton shortly after noon. In addition to his observer, he carried the prescribed useful load, and was in the air for three hours and twenty minutes.

Lieutenant Thaw, whose brother, Lieutenant William Thaw is flying with the American aviators in France, was forced by engine trouble to descend near Flushing. He volplaned to earth safely and telephoned for a repair crew, which arrived from Mineola in an automobile. The repairs were speedily made and he resumed the flight and drove straight to Princeton.

"Hobey" Baker, who recently received his preliminary certificate as a Government aviator, was the first to land at Princeton.

The return flight to Mineola was made Sunday.

Two of them, Noyes and Stevenson, won their reserve military pilot's licenses by successfully making the round trip. Most of the others already had completed their tests, and the journey meant nothing more for them than a novel undertaking in the name of sport.

The heavy mist which all but obscured landmarks on the entire distance added to the difficulties of the homeward flight, and three of the pilots flew several hundred yards beyond the Hempstead Plains before discovering their whereabouts. Salmon led the next closest flier to him by about ten minutes, and the rest reached the field at similar intervals.

They were welcomed by a crowd of aerial enthusiasts, who congratulated them on their achievement.

Brigadier-General Evans Retires

Brigadier-General Robert K. Evans, commander of the Hawaiian Department, retired from active service November 19 on account of age.

His retirement concludes a continuous service of forty-five years, including the Indian campaigns, the Spanish War and the Philippine insurrection. He is a former chief of the Militia Affairs Bureau and a former assistant chief of staff. General Evan's has always taken a most enthusiastic interest in aeronautics.

Chief Signal Officer Flies to Pershing

Brigadier-General George P. Scriven, chief signal officer of the United States Army, journeyed by aeroplane on November 18 from Columbus, N. M., to Colonia Dublan, Mexico, on an inspection trip to the American punitive expedition. He is the first general officer to make the trip through the air.

Telegrams received from General Pershing's force said the trip of more than one hundred miles was made in about two hours, the aeroplane attaining a speed of 100 miles an hour at times.

Navy Aviator Class Increased

A new class, consisting of twenty-two commissioned officers and 100 men of the United States navy, arrived at Pensacola, November 17th, to take up instruction at the Aviation Station. Most of the officers are lieutenants. Some of the thirty flying machines for the aviation station have arrived.

Curtiss Training Field at Miami

Mr. Glenn H. Curtiss has just returned from a trip to Florida in quest of suitable winter headquarters for an aviation school. Mr. Curtiss announces that he has chosen Miami as the most desirable location and that a large military school will be established there by him, but under the control of the War Department and for the training of aviators for the Aviation Reserve Corps.

The location chosen is on the edge of the Everglades, which furnishes a million acre aviation field, and is said to be ideal from every standpoint. The school will be opened for students early in December.

Norwegian Plans Sea Flight in American Built Flying Boat

Kjell Nyegaard, a Norwegian naval lieutenant, and Hugo Sundstedt, a Swedish naval captain, will sail to New York soon to prepare for a transatlantic aeroplane flight. They will carry as a passenger Lieutenant Nyegaard's wife, who was Mlle. Foranze.

Lieutenant Nyegaard expects to purchase a Curtiss machine of larger type than that built for Rodman Wanamaker. He intends it to be a triplane of 131 feet wing spread, equipped with six motors of 160 horsepower each, capable of lifting 5,000 kilograms (55 tons), carrying six persons, with a fuselage constructed like a motor boat, with a water propeller, so if forced to alight on the ocean they can chop away the planes, proceeding as a power boat.

They expect to start from Newfoundland in April or May, when favorable winds prevail, and reach Ireland in twenty hours, continuing to London without stopping if all is well. The performance would win the Paris Matin and London Daily Mail prizes of $50,000 each, besides other cash awards.

Army and Navy Orders

Lieutenant (junior grade) F. G. Reinicke, to naval aeronautic station, Pensacola, Fla., December 4.

Lieutenant (junior grade) De W. C. Ramsey, detached, command of the Tingey and torpedo boats in ordinary, to naval aeronautic station, Pensacola, Fla., December 4.

Lieutenant (junior grade) E. W. Coil, to naval aeronautic station, Pensacola, Fla., December 4.

First Lts. Martin F. Scanlon, inf., detached list, and Richard B. Barnitz, cav., detached list aviation students, from Sig. Corps Aviation School, San Diego, to San Francisco, thence to Philippines, December 5, and on arrival at Manila report for duty with 1st Co., 2d Aero Squadron, Sig. Corps.

First Lts. John C. Walker, Jr., inf., detached officers' list; Paul Ferron, C. A., detached officers' list, and John D. Von Holtzendorff, F. A., detached officers' list, attached aviation section of Sig. Corps as aviation students, from Sig. Corps Aviation School, San Diego, to Columbus, N. M., for duty with 1st Aero Squadron, Sig. Corps.

The National Guard officers and men who are studying military aviation at the Mineola Flying Field. Left to right (standing): 2nd Lieut. F. Ward, Arkansas; 1st Lieut. A. Coyle, New Hampshire; Sergt. L. Smith, Georgia; 2nd Lieut. E. Bagnell, Nebraska; 2nd Lieut. I. Wheaton, New York; 1st Lieut. H. Ilse, Washington. Sitting, left to right: 1st Lieut. H. Wehrle, West Virginia; Capt. R. Taylor, Conn.; 1st Lieut. B. Cummings, Colo.

Wright-Martin Aircraft Corporation Stock

According to the *Wall Street Journal,* recent financing done by the Wright-Martin Aircraft Corporation put $5,000,000 new cash into the company's treasury, which, in addition to the $1,800,000 fixed assets and $2,200,000 working capital, represented, at the time the Simplex Automobile Company of New Burnswick was acquired, makes a total of $9,000,000 represented in the present plants and organization owned and controlled by the Wright-Martin Corporation. This is equivalent to $180 a share on the 50,000 shares of preferred stock of the new corporation, and does not include value of good-will, patents, etc.

The license to manufacture the Hispano-Suiza motor in this country is an asset of great value. This motor is used by both the French and Russian Governments. Motors of this design built at the New Brunswick works of the Wright-Martin Corporation have not only equalled the French-made motors, but are said to surpass the French make both in horsepower developed per pound of weight and in economy in gasoline consumption. The Wright-Martin Corporation is now working on an order for 450 of these motors for the French Government.

Lighter Than Air Aviation Booms

Renewed interest in a branch of aerial defence—a lighter-than-air section—which the prominence since 1910 of the aeroplane has cast into comparative obscurity, is being taken by the War Department of the United States.

Within the last few weeks much has been done. The Army has ordered three kite balloons and two spherical balloons. The first lighter-than-air aircraft station is to be established at Omaha. Major Charles DeF. Chandler has been put in charge of this station. Announcement has been made that A. Leo Stevens, himself an old balloonist and manufacturer of lighter-than-air craft, had been appointed an Army instructor in the operation of dirigibles, kite and spherical balloons.

The United States Navy, too, has become interested in balloons, especially in dirigibles. No orders have as yet been placed, but it was learned that the Navy Department had under consideration several plans for dirigibles of the rigid type.

At virtually every fortified place in Europe there are kite-balloons. There are balloons stationed at every army aerodrome abroad, and there are strings of these floating towers of observation four miles behind the lines of the conflicting powers. Men stationed in them observe every movement on the part of the enemy, and report them by wireless to the aviation commanders and the officers of the line. Almost every European warship has its kite-balloon.

Although the department has not been noticeably active within the last few years, the United States already has the Aerostatic Section, which deals with lighter-than-air craft. The Army contains such aeronauts as Major Chandler, who raced in the International Balloon Races; Major Frank P. Lahm, who organized the balloon classic, the Lahm Trophy, held annually from 1907 to 1910, and Stevens, who, with the late Lincoln Beachey, built small dirigibles before the aeroplane was known.

Scriven Predicts Strong Aerial Defense on Border Soon

At a dinner given in his honor at San Antonio on November 15, Brigadier General George P. Scriven, chief of the Signal Corps of the United States Army, said that soon Major General Funston would have a very efficient aerial arm under his command.

"Already more than $2,500,000 worth of aeroplanes are under orders to move from the Army concentration points and the bulk of them are coming to San Antonio," General Scriven said.

New Aero Squadrons

Major Benjamin D. Foulois, aviation section of the Signal Corps, who has been on duty in the office of the chief signal officer in Washington, has gone to Fort Sam Houston to begin work of organizing two new aero squadrons there. He reported last Monday morning to Major-Gen. Frederick Funston as aviation officer of the Southern Department, a new position in the Army. It is probable that two months or more will be required to get the squadrons in working order. Capt. Robert H. Willis, Jr., and First Lieut. Thomas S. Bowen, Signal Corps, have been assigned to duty at Fort Sam Houston in connection with organization and operation of the squadrons. Each aero squadron will have 12 aeroplanes and considerable other equipment, the list including 23 motor trucks, one seven-passenger automobile, 7 motorcycles, 12 portable canvas hangars, 2 portable machine shops and stock material, 10 spare aero motors, full assortment of spare parts for aeroplanes, and all wheel equipment; fuel and oil sufficient to last six months, photographic and signal equipment, 12 machine-guns and ammunition, and a supply of rifles, shotguns and revolvers.

According to estimates, it will cost approximately $465,000 to equip each squadron, exclusive of ordnance and quartermaster supplies. The two squadrons will have a combined strength of 1,300 men. Officially the squadrons to be formed by Major Foulois will be known as the Third and Fourth. The First is being organized at Columbus, N. M., and the Second in the Philippines. Major Foulois said this week that the aeroplanes for the squadrons are under construction for the Government.

Burgess News

Six training aeroplanes of noval design are now under construction by the Burgess Company for the War Department. They are to be constructed for elementary courses in flying at the Army Aviation School and for this reason embody a unique feature. This is the seating of pilot and passenger side by side in the stream lined fuselage instead of tandem fashion, following the usual custom.

The machine will be of slow speed and comparatively small wing area. The power will be supplied by a Curtiss O X 2 motor, furnishing between 90 and 100 h.p.

Another novelty in the design is the arrangement of the struts, which will be vertical at the center and then slant outward from bottom to top as the extremity of the wing span is reached, giving the effect of portions of radius of a circle whose center is located somewhat beneath the landing gear.

The landing gear will be practically that of the Curtiss J. N. type, with a small wheel in front added for further safeguarding the pupils in landing before they have fully mastered the technique of this branch of aviation.

Numerous extensions are being made at the plant of the company, owing to the increased pressure of work. A total exceeding 3,000 square feet of floor surface will be added and the consequent rearrangement of the departments is expected greatly to facilitate work of production. The new arrangement will give a special department for the work on pontoons and will also extend an opportunity for assembling large size aeroplanes.

Meanwhile, school work is continuing, despite unfavorable weather. Three Harvard students, Messrs. Merrick, Richmond and Pulitzer, are making rapid progress and will soon be ready to take out their certificates. Gordon Prince, brother of Norman Prince, recently killed in aviation service in France, has virtually completed his preliminary course, and has made his first tests for his license.

Concerning Army Aviation Instruction

As the work of securing materials for the Aviation Section of the Signal Corps is well under way the problem of providing a trained personnel has been taken up by the Signal Corps. The first step in this direction has been the establishment of a school for the training of aviator instructors. One school has been established at Mineola and it is understood another will shortly be inaugurated at Omaha. Student instructors at these schools will occupy a status of civilian employees, and under the Defense Act the War Department is authorized to pay them $100 a month. When they qualify as instructors they receive $300 a month. From this grade they are promoted to senior instructors at a salary of $350 a month, and later to chief instructors at a monthly salary of $400. Chief instructors receive an increase of $200 for every year's service until they reach the maximum pay of $6,000 a year. With such inviting opportunities for civilians it is expected that some of the most daring flyers will become candidates for instructors. It is stated that there are comparatively few aviator instructors in the country. Many excellent and daring flyers have had no experience in the instruction of students. There is a very gratifying prospect of securing an excellent corps of Reserve officers for the Signal Corps. The Aviation Section has received about 1,200 requests for blanks from candidates for the Reserve Corps. The candidates who qualify physically and comply with the educational specifications set forth in G.O. 55, War Department, Oct. 16, but cannot come up to the flying qualifications, will have an opportunity to enlist as non-commissioned officers and will be sent to the school for instruction. When they qualify as officers they will be commissioned. Eight candidates for Reserve officers reported for examination at Washington on Oct. 31. The board which is conducting the examinations consists of Major A. W. Williams, Med. Corps, Capt. Thomas De Witt Milling, Signal Corps, and Capt. H. W. Harms, Signal Corps, U. S. A.

Hydroaeroplane Exhibited at Auto Show

The Sturtevant Model S seaplane, owned by the Rhode Island Naval Militia, will be exhibited at the Providence Automobile Show. The Aeronautic Section has also been given a booth by the show management, at which members will be detailed to give information about the work.

Several enlargements of photographs of various parts of Rhode Island, taken from the hydroaeroplane, will be on exhibition at the booth. Extra parts for the flying boat will also be shown, and the clothing worn by the pilots will form an interesting portion of this display.

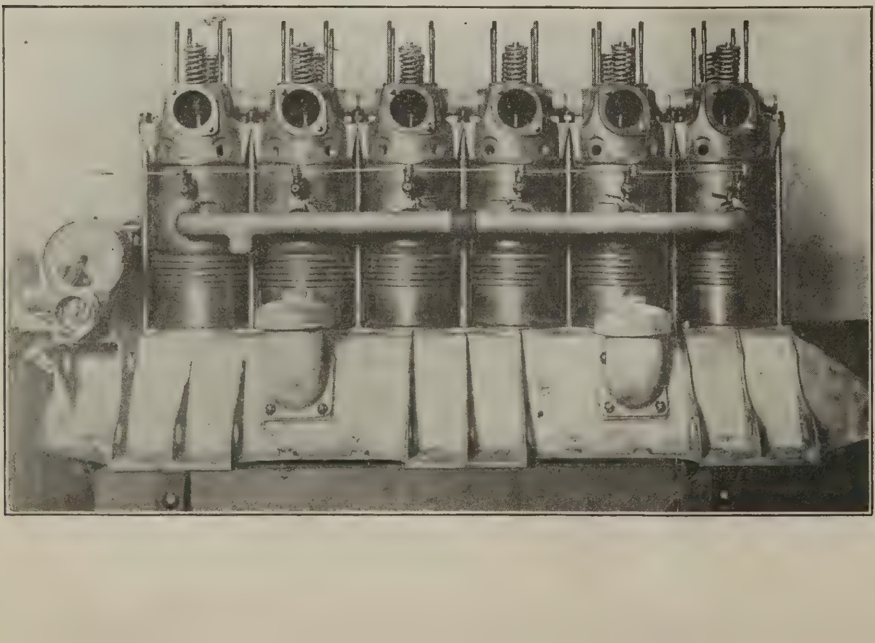
Miss Stinson May Go to Australia and Japan

According to press despatches it seems very probable that Miss Katherine Stinson will make a tour of Australia and Japan during the coming spring and summer. Last summer Miss Stinson made a most successful tour of Canada.

H. A. Meldrum and A. H. Knoll to Take Course in Aviation

Two Buffalo business men enrolled as students in the aviation classes at the Curtiss aeronautics school and have received their first flight lessons under the direction of Lieutenant Phil Rader. The new students are Herbert A. Meldrum and Augustus H. Knoll.

Both are former presidents of the Automobile Club of Buffalo and were pioneers in Buffalo among the automobile enthusiasts. They now want to be early in the aeronautic field.



The new type of cylinders used in the new six cylinder Hall-Scott aero engine, which developed 162 h.p. at 1,360 r.p.m. at a four hour test recently. By the use of the new type cylinders the weight of the motor has been reduced 30 lbs.

Mr. Woodhouse Lectures to Rotarians

Facts regarding the tremendous development of aeronautics and the prospects for extensive employment of aircraft for war and peace were presented by Mr. Henry Woodhouse, a member of the Board of Governors of the Aero Club of America, on November 16, to 250 members of the Rotary Club, at the McAlpin Hotel. Among other things, Mr. Woodhouse stated that there are 25,000 aeroplanes in use in the world and the reason why there are not more is that they cannot get them fast enough to replace those that are put out of action or worn out daily.

"The largest aeroplane," said Mr. Woodhouse, "has a carrying capacity of 15 tons. Plans are ready for an aeroplane of twice that size, capable of lifting 30 tons.

"American aeroplanes and motors are equal to the best. Victor Carlstrom, who flew from Chicago to New York and from New York to Washington, told me the other day that the efficiency of American motors and American aeroplanes is such that anything is possible. It is only a question of making a plan and carrying it out. A flight of over 1,000 miles in one day is possible.

"The one important development that has taken place which has changed the aspect of things in aeronautics is that the motor has been so improved that it can now outlast the aviator. Heretofore, since 1910, the aviator always outlasted the motor. Before that, men knew little of the requirements of flight and the motor, although rather inefficient, outlasted the man, who was, however, not yet an aviator.

"Now that the motor is efficient and outlasts the aviator aeroplanes equipped with from two to six aeroplane motors carrying up to 30 people can be built and employed for commercial purposes. A trans-Atlantic air-line is quite possible.

"Great Britain is spending $250,000,000 in military aeronautics this year; 500,000 people are working producing and operating aircraft and aeronautic supplies.

"The American aeronautic industry has and is about to get orders amounting to $50,000,000.

"A half dozen countries have between 2,000 and 10,000 aviators. The United States Army and Navy together have only about 100. The European countries have thousands of observation balloons and hundreds of dirigibles. The United States Army and Navy together have only four observation balloons ordered and one small dirigible."

America Preparing to Build a Zeppelin

The Navy Department will soon be able to advertise for bids on the first made in America Zeppelin. This was learned in connection with the fact that the department has been gathering information on the construction of the successful German type airship for months.

The Navy Department has received parts of Zeppelins from Europe, including samples of the aluminum alloy used in the framework, sections of the balloon frame showing the methods of bracing and parts of the balloon cover.

Chemists are now working on the composition of the aluminum compound used in the framework in order to duplicate it, and it is expected they will succeed before long. This alloy is as light as aluminum and as strong as steel.

It is not believed by the department that the first Zeppelin will be a howling success, but with the data collected and coming in it is believed a good start can be made.

Sturtevant Activities

Contracts for eighteen new military biplanes have been awarded to the Sturtevant Aeroplane Company of Jamaica Plain, at a price of $9,500 each, to be delivered to the United States Army as soon as possible.

Plans have just been completed for building an addition 90 by 120 feet, of steel and concrete and one-story high with a large gallery. This will be used as an assembly building and will be large enough so that a machine with a spread of 100 feet may be set up.

The present factory is sixty feet wide and about 125 feet long, three stories high and built of brick. It employs seventy-five men on the average, nearly all the most highly skilled of machinists and woodworkers. When the addition is finished its force will be about doubled and will be able to turn out two machines a week and perhaps even more.

It has so many orders ahead that the rush of work will keep up for months.

Naval Men to Study at Columbia

Prof. Charles E. Lucke, of the graduate engineering school, Columbia University, announces that five lieutenants in the Navy have been assigned by the Navy Department to study under his supervision.

Three of them—Harold Stacey Burdick, Lorain Anderson and Sidney M. Krause—will specialize in aeroplane motors. Two—Francis Grant Marsh and Herbert W. Underwood—will study submarine oil engines.

This is the first time such assignments have been made by the Government. Prof. Lucke believes they indicate the aim of the Navy Department and the Advisory Committee on Aeronautics to bring into the Navy special knowledge of improvements in submarine and aeroplane motors.

Garden City Notes

Laurence J. Lesh has been fostering night flying lately, having equipped one of the Curtiss machines with his searchlight. The De Forrest device, by means of small propeller, generated a supply of electricity which is used for the searchlight, or can be made to operate the wireless system. Residents in the vicinity of Garden City, when witnessing what appears to be a shooting star, now listen for the hum of a motor that accompanies the streak of light across the sky.

Personal Paragraphs

Oscar A. Solbrig, the Davenport, Iowa, aviator, made exhibition flights at the Oregon County Agricultural fair last week.

Louis Gertson flew at the Utah State Fair Semi-Annual Mormon Conference in Salt Lake City, Otcober 3-7th, inclusive, five days and nights. Gertson made a tremendous hit. He also flew at Richmond, Ind., October 16th-21st.

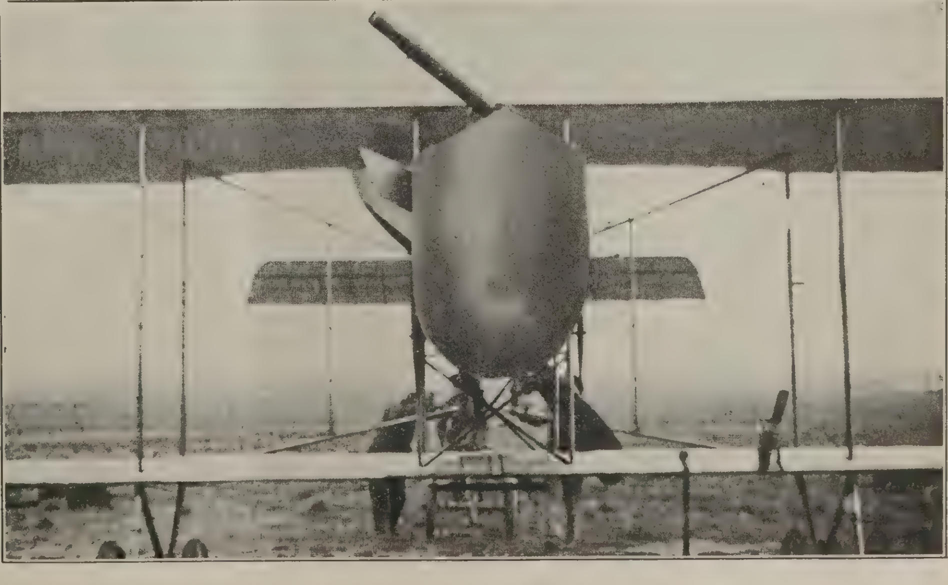
E. C. Christy, of San Francisco, a member of the Aero Club of America, died October 19, from injuries sustained when an aeroplane in which he was flying turned over in the air and plunged to the ground. Christy was pinned beneath the wreckage.

TIGHT CORNERS AND HOW TO GET OUT OF THEM

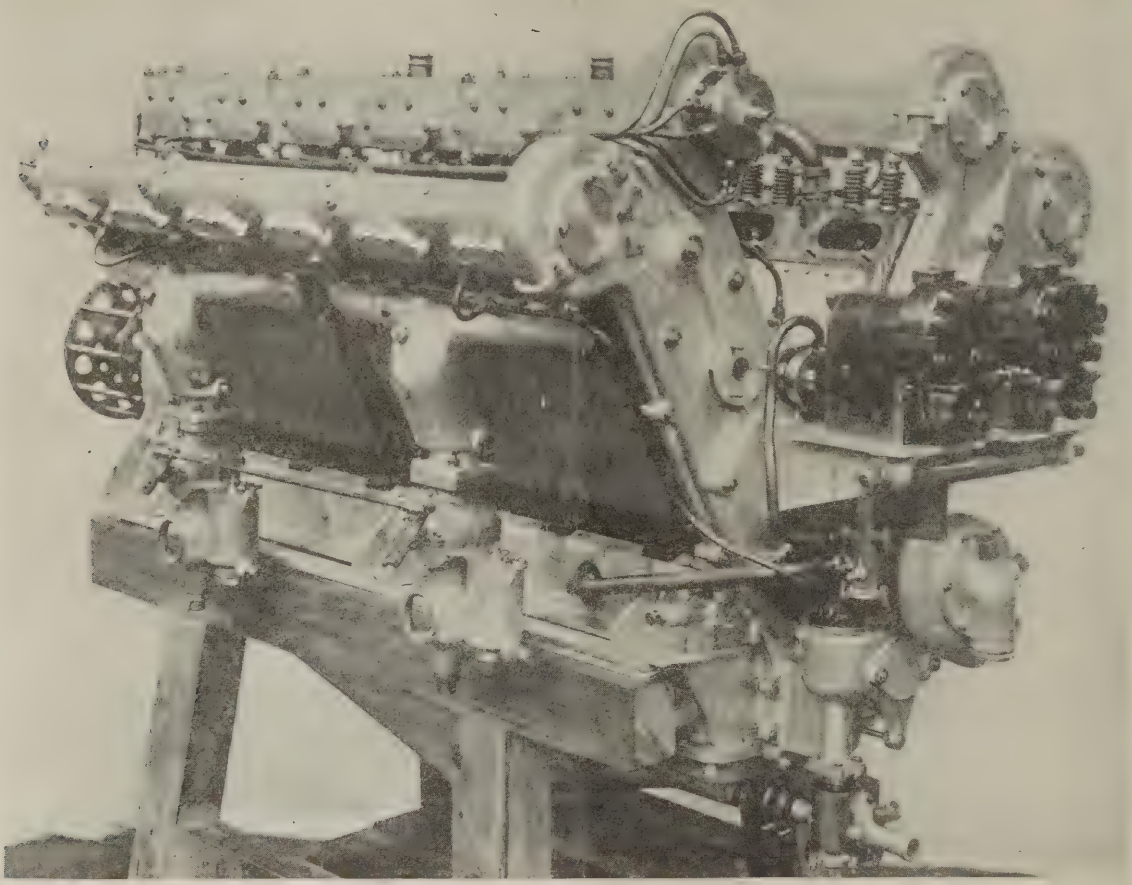
By J. GUY GILPATRIC

Spinning Nose Dive, or Tail Spinning: A condition possible on most present-day machines, particularly seaplanes, is one which is not generally understood by pilots, and is extremely dangerous on this account. I refer to the tail spin, or spinning nose dive. When the vertical side areas on a machine—comprising a projection of fuselage, interplane struts, chassis, fins, rudders and pontoons—if any—are incorrectly proportioned, a machine may be spirally unstable. That is, if the side areas ahead of the vertical C. G.—the lateral pivotal axis of the machine—are too great, the machine will tend to pivot around its nose. This spirally untable condition may not arise until the machine is stalled on a sharp turn, or sharply turned at low speed when insufficiently banked. The machine will start what feels like, and what appears to be, a side slip. Then the nose will drop and the tail start to swing around, describing a circle larger than that described by the nose. The circles described by the nose and the tail will be apparently concentric. Unless proper means are taken by the pilot to check the spin, it will continue until a smash occurs.

There does not seem to be any generally accepted method among pilots to check a tail spin. The writer has tried the following method with success after the machine has been started spinning intentionally. First, if the spin is in a direction opposite to that of the propeller rotation, and is hence possibly increased by reverse torque, either throttle or cut the motor dead. Then push the control all the way ahead and rudder against the spin. If the combination of rudder and elevators does not adjust matters, wait until the latter have placed the machine in a vertical position, at which time the machine will be describing a kind of corkscrew nose dive. Then, by putting the ailerons hard over, against the direction of the spin, an ordinary vertical dive will ensue. The machine can then be righted with the elevators in the conventional way, and complete control may be assumed. Above all things the pilot should not be dismayed if his controls do not immediately "take hold." At least two bad smashes observed by the writer have been caused by pilots using the controls at random—and frantically—when the machine did not at once respond to their proper use.



A new type of fusilage construction and placement which is meeting with considerable favor in France and England. Note the distance of fusilage from lower wing surface, and formation of supporting members.



STERLING-SUNBEAM AERO ENGINES

THE Sterling Engine Company, of Buffalo, N. Y., builders of high grade gasoline marine motors, have acquired the American rights and license for manufacturing Sunbeam-Coatalen aero motors, and it will be known in this country as the "Sterling-Sunbeam."

The motor will be built under the plans and formulas and direction of the Sunbeam Motor Car Company, of Wolverhampton, England, and the motors as built by the Sterling, will be built to duplicate. Among the motors that will first be produced will be the 8-cylinder, 150 H.P.; 12-cylinder, 220 H.P., and the 12-cylinder, 320 H.P., but the first motor to be built will be the 320 H.P., 12-cylinder.

The Sterling Engine Company expects to have this 320 H.P. motor under test in three months, as the work is progressing very rapidly on this particular motor. It will be the policy of the Sterling Engine Company not to put this motor out onto the market until it has produced its first two or three motors for test.

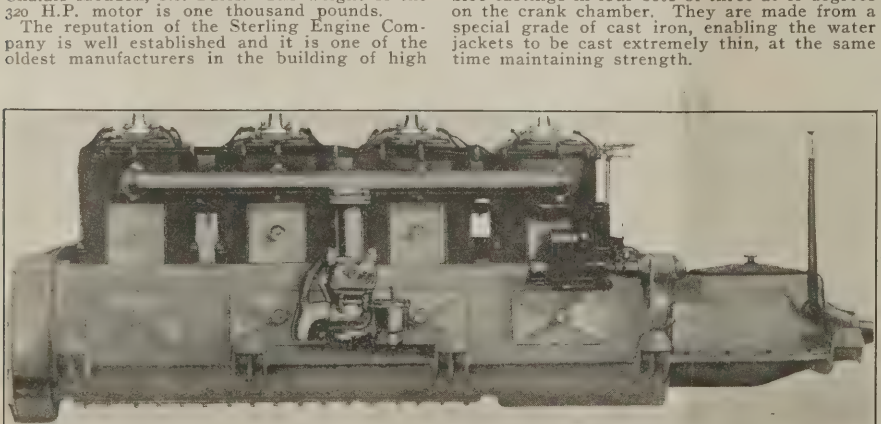
This same motor has passed the English Admiralty test, and recently passed a very successful test for the French Government, at Chalais Meudon, Nr. Paris. The weight of the 320 H.P. motor is one thousand pounds.

The reputation of the Sterling Engine Company is well established and it is one of the oldest manufacturers in the building of high grade gasoline motors; building powers from ten to three hundred horsepower. They have been brought very promptly into public notice in the marine field, on the production of their Model-F marine motor. A great many of them have been used and have taken an active part in scout and patrol boats about England, Italy and Russia. The motor used most extensively for this service is the 8-cylinder, 5½ x 6¾, developing 200 H.P. at 1400 R.P.M.

The Sterling Engine Company also has the distinction of powering boats that have won the Classic Gold Challenge Cup for the last six consecutive years, and hold world's fastest speed record, so the producing of Sunbeam motors should be in very good hands when fostered by a company of such wide experience as the Sterling Engine Company.

Following is a brief description of the British Sunbeam-Coatalen as designed by Mr. Louis Coatalen, and which in general characteristics is to be reproduced in the new American "Sterling" Sunbeam.

Fixed "V" type cylinders are disposed in **en bloc** castings in four sets of three at 60 degrees on the crank chamber. They are made from a special grade of cast iron, enabling the water jackets to be cast extremely thin, at the same time maintaining strength.



The Sterling Marine Engine.

Valves are on the inside of each row of cylinders and are actuated by a single camshaft which is housed in the top of the crankcase, between the two sets of cylinders, and lubricated by oil fed from the main duct.

The crankshaft is carried by bearings, between each throw, of large diameter.

Connecting rods are arranged so that the big ends are side by side on each crank throw. The opposed cylinders are staggered in relation to each other to allow this. The water circualtion is by a gear-driven centrifugal pump.

Two magnetos are fitted, each operating six cylinders.

Lubrication is forced by a gear-driven pump, which is fed direct from an oil tank separate from the engine. This forces the oil to the main bearings, and from thence it passes through the hollow crankshaft to the big end bearings. From these bearings it is splashed to lubricate the cylinder walls, after which it runs to the pump through a filter of large dimensions, and is returned by a secondary pump to the oil tanks, so that it is not exposed to the heat generated in the crankcase for any length of time. It thus retains its lubricating properties, enabling the oil to be used over and over again.

The engine is fitted with a reduction gear of 2-1, enabling a large propeller to be used at a slow rate of revolution with great efficiency; at the same time a very even torque is imparted by the engine to the propeller.

The reduction shaft is specially mounted on ball bearings, and is provided with a special design of thrust bearing, thus allowing the engine to be used for either a tractor or a propelled type of machine without alteration to the design.

Specifications

Bore and stroke: 90 mm. x 150 mm.
Crankcase: Special strong aluminum alloy.
Self-starter: Special air distributor fitted with valves and pipes, complete, ready for coupling up to a compressed-air bottle.
Ignition: 2 high-tension, 6-cylinder magnetos.
Carburetors: 4 C. Z. 40 mm.-type Claudel Hobson.
Revolutions: Normal revolutions of the engine 2000 r.p.m. giving a propeller speed of 1000 r.p.m.
Fuel consumption: The consumption of gasoline is about .58 of a pint per h.p. hour and the consumption of oil is about ¾ gallon per hour.

ALUMINUM IN MODERN AUTOMOBILE AND AVIATION CONSTRUCTION

By JAMES E. DIAMOND, Chief Engineer, Aluminum Castings Co.

Aluminum in nature is more abundant than any other metal, constituting as it does, 8 per cent of the earth's crust. It is the basic metal of all clay, although not all clays readily lend themselves to reduction. But three of these clays deserve to be classed as ores of aluminum—bauxite, cryolite and corundum. Of these bauxite ranks first in importance, since it can be refined with greater facility than either of the others.

The word bauxite is the corruption of the name of the town of Les Baux, France, where the first valuable deposit of this particular ore, hydrated oxide, was found. In this country, bauxite in combination with the impurities silicon, ferric oxide, and titanic acid, is found in the middle Southern States.

At the beginning of the nineteenth century the existence of aluminum was not suspected, in spite of its remarkable abundance. About the end of the first decade, however, Sir Humphrey Davy advanced the hypothesis that there must be some metallic base in clay. The German physicist, Woehler, some years later proved the correctness of Davy's hypothesis and first obtained the metal by decomposing aluminum chloride with potassium, the reaction producing aluminum in the form of a powder. Later, Woehler succeeded in obtaining malleable globules. This was of course only laboratory production. It remained for a French metallurgist, Deville by name, so to modify and improve Woehler's process as to make aluminum a purchasable commodity, the price then being $90 a pound. These improvements resulted in the production of nearly pure aluminum. It was Deville who first determined the properties of the metal. From then until 1886 was a period of constant experimentation, the Deville processes being improved in various ways.

In the year just mentioned came a revolution in the art of producing metal. Just prior to this time the dynamo had reached the point of its development where it was no longer a piece of laboratory apparatus, but was actually a commercial producer of electricity. This made electrolytic processes possible. It was not long before experimenters sought by this method, rather than by chemical action and reaction, the truly commercial production of aluminum. In 1886 Charles M. Hall discovered a process of producing aluminum from alumina (oxide of aluminum) by electricity, using this agent in a twofold manner, in this process combining the principles of the electric furnace and the electrolytic bath. Commercial production was at one stroke attained.

Production of Aluminum from Bauxite

The first step in the reduction at the refinery is determined by a peculiarity in the metallurgy of aluminum. With the ores of most other metals it is necessary simply to concentrate and separate the true ore from the gangue by mechanical means, which take advantage of the different densities of the two parts. The ores are then smelted and the impurities worked out by various methods of refining. In the case of aluminum, the ore must be carefully refined before smelting. In refining the bauxite, advantage is taken of the fact that alumina forms with soda a compound called sodium aluminate, which is soluble in water. The impurities, iron oxide and titanic acid, are insoluble and silica is nearly so. The sodium aluminate is formed either by roasting the bauxite with carbonate of soda (known as soda ash), or by digesting with caustic soda in a closed vessel under pressure. In either case sodium aluminate is formed and is separated from the impurities by filtration and by washing the residue with hot water. The sodium-aluminate solution is decomposed by two methods, the alumina being thrown out of solution as a hydrate. In the Bayer process the solution is decomposed by agitation in the presence of some freshly precipitated hydrate. The spent liquor is drawn off and is used to take up a fresh quantity of alumina. Another method of decomposition employs the injection of carbonic acid, which forms carbonate of soda and aluminum hydrate. This hydrate then is carefully washed to free it from soda salts.

When apparently dry the aluminum hydrate contains 34 per cent of water chemically combined, which must be removed before the ore is ready for reduction. The hydrate is therefore placed in furnaces where it is subjected for 48 hours to a heat gradually increased to 2,000 deg. F. The removal of the water from the hydrate leaves it alumina, as it comes from the furnaces. This looks like a white powder. Now is the point in the process in which the electric current is utilized in the Hall process of reduction. The reduction plants are located at points where water power is availiable in large quantities. The heat and electrolytic actions of the electric current reduce the oxide to pure aluminum, the reduced metal collecting at the bottom of the reduction pot and being tapped off and cast into ingots.

Physical Properties of the Metal

The fundamental advantage of aluminum is quite naturally that of lightness. The specific gravity of pure aluminum when cast is 2.59; when rolled, 2.68. The specific gravity of iron is about 7.21; that of steel somewhat higher. Thus it will be seen the weight of aluminum is, for equal volumes, but slightly more than one-third that of iron. The coefficient of expansion of aluminum is 0.000022 per degree Centigrade (Richards); that of iron is 0.0000119 per degree Centigrade (Roberts-Austin). The melting temperature of pure aluminum is 659 deg. C. or 1218 deg. F. The specific heat of aluminum is 0.22. Its thermal conductivity based on the conductivity of pure silver as unity is 0.313. Of the baser metals copper with 0.5 is the only one that exceeds it in thermal conductivity. The conductivity of iron is 0.11 or only one-third that of aluminum. It has recently been discovered that the thermal conductivity of aluminum increases with its temperature, and at a temperature of 700 deg. F. is practically three times the conductivity at ordinary temperature. The electrical conductivity of aluminum is 60.5 per cent that of copper for equal volumes, and since copper is three times as heavy, its conductivity is higher, weight for weight. Aluminum is preceded by gold only in malleability, preceding in this respect silver, copper, tin and platinum. It ranks sixth in ductility. The tensile strength of approximately pure aluminum is about 15,000 lb. per sq. in. Therefore, as far as strength is concerned, it is seen that even in the un-alloyed state, weight for weight, it will compare favorably with fair grades of cast steel.

It was early discovered that aluminum unalloyed was too soft, and that structures cast in it lacked rigidity. A number of alloys have been developed that have corrected the inherent limitation of the pure metal, at the same time sacrificing only to a limited degree its fundamental advantage of lightness.

The most widely used alloying metals are copper and zinc. Copper and aluminum alloy particularly well with high or low content of either metal. The aluminum bronzes with high copper content have been found to be equal, if not superior, to any other bronze so far developed. The copper-aluminum alloy most commonly used has a tensile strength of about 20,000 lb. per sq. in. Zinc alloys have been developed having greater strength, but at the present time probably 95 per cent of all automobile and aviation engine castings are made of copper-aluminum alloy.

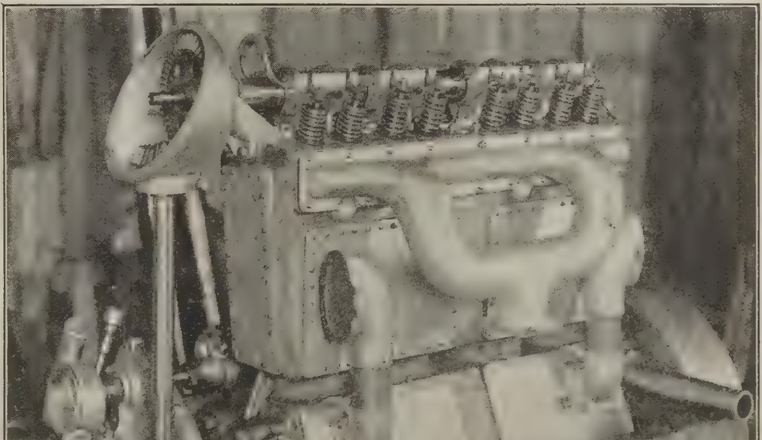
Casting of Aluminum

The production of aluminum castings is a science in itself, and present-day success is built on many early failures. It is a long cry from the first attempts at castings to the complicated work turned out today. The mere possession of the formulas of suitable alloys by the foundry is not all that is required. Haphazard methods in the foundry are not conducive to the production of sound castings. In the early days "hit or miss" methods in the metal room in the preparation of the "charge" resulted in a great variation in quality of castings. It was found necessary in the furnace room to control the temperature lest the metal be burned. Too high a temperature destroys the natural vitality of the metal, and castings made from this burned metal are brittle.

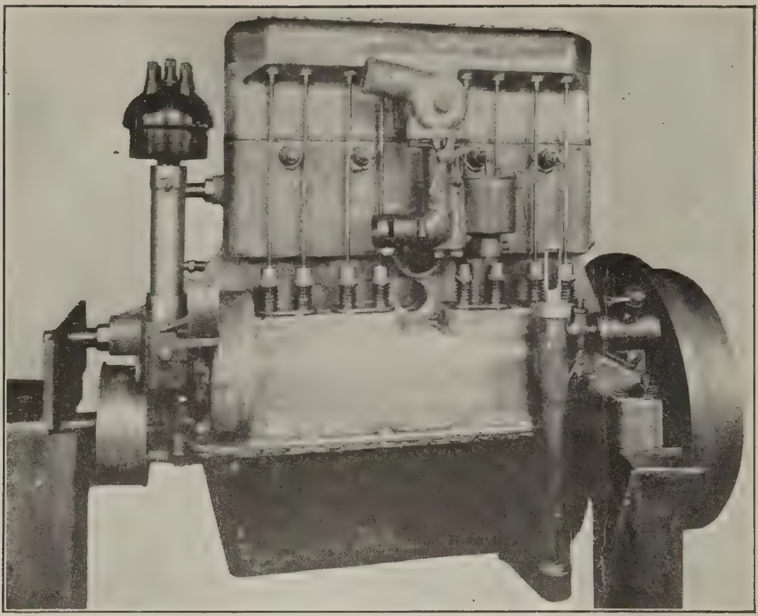
Insofar as strength is concerned, probably no one factor is of more vital importance than the pouring temperature. The lower this is the stronger the casting. The casting that has barely escaped being a "mis-run" in the thinnest sections, because of a low pouring temperature, is the best casting from all standpoints. The reason for this is found in the rapidity of crystallization. Naturally where the metal is poured cold, so to speak, the crystallization takes place quickly, and the crystals do not have time to arrange themselves in orderly manner, as they do if a longer time is granted. The production of successful castings requires careful attention to all the little details. In the foundries of the Aluminum Castings Company technically trained men supervise every stage in the evolution of a casting, from the analysis of the virgin ingot to the delivery of the casting to the sand blast. Every foundry bay has a pyrometer, each casting being poured at the temperature an expert has determined to be the proper one, that is, just short of a mis-run. It is not too much to say that it is this technical oversight all along the line that makes it possible, to cite an actual case, to produce 125 crankcases, weight about 100 lb. apiece, in a day, and yet have an insignificant defective casting loss.

Applications of Aluminum Castings

Aluminum has from the first been employed on automobiles for the larger units, such as crankcases and transmission cases. I am speaking now of the construction in which the crankcase is a unit in itself. As a matter of fact there are few engines in which the cylinders and crankcases are not integral, where other than an aluminum crankcase is employed. In these one or two cases, cost—not structural considerations—has been the governing factor. With out exception, the cost element is the only obstacle in the way of



Chevrolet aluminum racing engine.



Sterling valve-in-head aluminum engine.

the universal employment of aluminum as a material for transmission cases.

Aluminum is used extensively, both in cast and in fabricated form, for aviation engines. Individual engines, here and there, have been built with pressed-steel crankcases, but assuming that this type of construction works satisfactorily it will always be more expensive than an aluminum crankcase, and it is questionable whether there can be any saving in weight. It can be stated absolutely that it is standard practice to use aluminum castings for crankcases in engines actually in production.

Aluminum lends itself well to the one other engine part of any size. This is the crankcase, lower-half, or oil pan, or a structure serving both purposes. In the great majority of cases this part is only a pan. In the contemporary design there seems to be a tendency to extend the sides of the crankcase, upper-half, or crankcase proper, well below the center-line of the bearings; that is, the crankshaft center-line lies above the plane of the bottom of the case. With such construction, the pan has no structural function.

The cast-aluminum pan has one or two advantages not possessed by the steel stamping frequently used. The prime importance of cooling the oil is generally recognized; in fact, considerable thought is being devoted to this at the present time. The employment of oil radiators on aviation engines is not an exceptional occurrence. It will not be particularly surprising to the author to see oil radiators used on high grade cars in the near future. Granted the importance of cool oil, the use of a cast-aluminum pan is at once an advantage on account of the thermal advantages of the metal, particularly as a pan can be designed that will take full advantage of this desirable attribute.

If it is important to keep the weight of the power plant at a minimum, much more essential is it to reduce to an absolute minimum the weight of the unsprung parts. Fortunately, rear-axle construction permits the use of aluminum. Aluminum has demonstrated its entire suitability as a material for the rear-axle housing or the differential carrier, no matter whether the design is conventional, or the construction that in which the transmission and differential are combined in one unit. Cast-aluminum axle-housing were employed several years ago, and several high grade cars use them today. I expect to see aluminum used at this point on all but the cheaper cars before a very long period has elapsed. The differential carrier contributes largely to the weight of the rear-axle structure. Cast-aluminum carriers have proved entirely successful; therefore, why carry around a chunk of metal twice as heavy as need be, at a point where lightness is so vital? One or two companies are now planning to employ aluminum carriers on future models. Some one has made the statement that 1 lb. of unsprung weight is the equivalent of 10 lb. of sprung weight in its effects on tire and running-gear wear and tear. I have in mind extensive experiments to determine, if possible, the relation between weight, both sprung and unsprung, and gasoline consumption and tire mileage. The results of rough experiments with a Ford car lead me to believe that some exceedingly valuable data will be obtained.

Development of Aluminum Engine

It is safe to say that no development of the past five years, not excepting even the appearance of the eight or the twelve, has created more real interest than did the disclosure last winter of the Lynite aluminum engine on the Marmon car. Aluminum engines had been built; in fact, Napier built an experimental unit as far back as 1901. Successful aluminum engines were built several years back, but only in small quantities. These early engines had no liners; the pistons ran directly against the aluminum cylinders. The builder of one of these early engines has informed me that no trouble of any consequence was ever experienced. In 1913 a large engine manufacturer build thirty Lynite aluminum four-cylinder engines. These were painted black to resemble stock iron jobs, put into cars and distributed, I might say almost indiscriminately, about the country. The individual owners did not know that their engines were different in any respect from those in the standard car.

The Hispano-Suiza aluminum eight-cylinder engine was put in production in Europe nearly two years ago. It has proved so successful that today it is being produced in quantity in several plants in France and in two plants in Italy. This is the engine the American rights for which have been acquired by the Wright-Martin Co. As far as this country is concerned, the Marmon Company is the pioneer in actual production, preceding by several months the announcement of the Wisconsin Lynite aluminum aviation engine, which, I believe, was the first aluminum aviation engine built in this country in production.

In order to discover the differences, if any, between aluminum and iron as cylinder materials, we have inaugurated laboratory experiments that will cover a considerable period of time. A fairly comprehensive preliminary run has disclosed no differences. These preliminary runs were made on a cast-iron and a Lynite-aluminum engine. The latter had cast-iron sleeves inserted, but otherwise the two were identical in design, or as nearly so as it was possible to manufacture. The type of valve was the overhead, the cylinders and the crankcase were cast integrally with removable cylinder heads. The all-Lynite engine weighed 400 lbs. The iron engine with cast-aluminum oil pan weighed 524 lb. and therefore was 32 per cent heavier than the Lynite engine.

It is sometimes said that, with the inserted sleeve construction the sleeves will become loose when the engine is hot. Not only does this not take place, but actually the reverse is the case. The temperature of the sleeve, which is in direct contact with the flame, is much greater than that of the aluminum barrel, the temperatures of which necessarily can not exceed that of the jacket water. The result is that the actual expansion of the iron sleeve will be greater than that of the surrounding aluminum.

While the removable-head overhead-valve construction is by far the best from the founder's standpoint for the use of aluminum, unless we except the sleeve-valve type of engine, practically every type of engine has been built in aluminum, although the construction first mentioned is used four times out of five.

Aluminum has so far demonstrated itself ideal for the sleeve-valve type of engine, there being no necessity for any fixed sleeve in the cylinder, the outer valve sleeves operating directly against the aluminum. A few rotary-valve and piston-valve engines have been built of aluminum.

(*To be concluded*)

Cylinder blocks for eight-cylinder aviation engine.

MODERN PROCESS FOR THE TECHNICAL PRODUCTION OF HYDROGEN FOR DIRIGIBLE AIRSHIPS AND BALLOONS

The Rinker-Wolter Process—A Chemical Process for the Decarburation of Oil

By HARRY L. BARNITZ, Ph. G.

(*Copyright*, 1916, *by Harry L. Barnitz*)

PART II OF A SERIES OF THREE ARTICLES.

*[In the following article the writer gives valuable data covering knowledge gained by 16 years' experience specializing in research work on the Technical Production and Application of Hydrogen. His long association in this field has made his counsel much sought by many of the largest industries in this and foreign countries. Mr. Barnitz has installed many plants here and abroad and is leading authority in the United States on the production and application of hydrogen.—*ED.]

PART II.

THIS process is the result of a research which originally aimed at the production of an illuminating gas, but failing in this a hydrogen-producing process was developed which has been used principally for portable installations. It is this process which is now being used in a few instances by Germany and Russia in their aeronautical work for portable plants. Complete installations are set up on railway cars and carried from point to point as required. The plant requires only moderate space and is not difficult to supervise, but requires skilled labor.

The process is one in which gas oil is used which is heated to 1200 to 1400 degrees C. and decomposed into its chief constituents, carbon and hydrogen. The plant comprises the special gas-making plant and purifiers. The gas-making plant consists of two producers which are charged with coke. There is a gas connection from the lower part of the first to the upper part of the second producer; near the furnace and clinkering doors of the producers are air inlets. These inlets are fitted with valves having interlocking gears to prevent accidents arising from careless manipulation. The air required to raise the heats in the producers is forced through these inlets by a high-pressure blower.

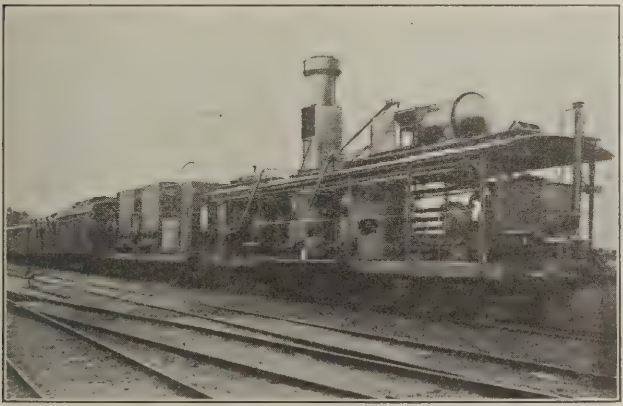


Fig. 1—Portable Hydrogen Gas Plant constructed for the Chief Engineering Department of the Imperial Russian War Office.

When the producers have reached the requisite temperature, the blower is stopped and the blast valves closed.. Oil is then pumped onto the coke in the first producer, through spraying nozzles which atomize it. It is converted into vapor by the hot coke and passes through the bed of hot coke in the second producer. In this way the vapor is converted into a permanent gas, which leaves the bottom of the second producer and enters a hydraulic main. When the air is in turn again blown in at the base of the producers in order to raise their temperature, the carbonaceous residue left by the oil on the coke is burnt and contributes towards the heating up of the producers. It requires one to one and a half minutes' blast to raise the producers to the proper temperature again. Thereupon oil is again introduced into the first producer.

The oil is preheated in order to render it sufficiently thin and mobile to pass through the spraying nozzle. For preheating the oil the exhaust steam from the turbine or engine used for driving the blower is utilized. Solid impurities are removed from the oil by pumping it from the storage tank through a filtering chamber.

The gas issuing from the second producer passes through a water seal in the hydraulic main, and there deposits the greater part of the sooty matter which is carried over mechanically. Clean water flows continuously into the hydraulic main, and the sooty water flows off and runs into a settling pit, having partitions which force the water to take a long and tortuous course in order to ensure the deposition of the solid matter.

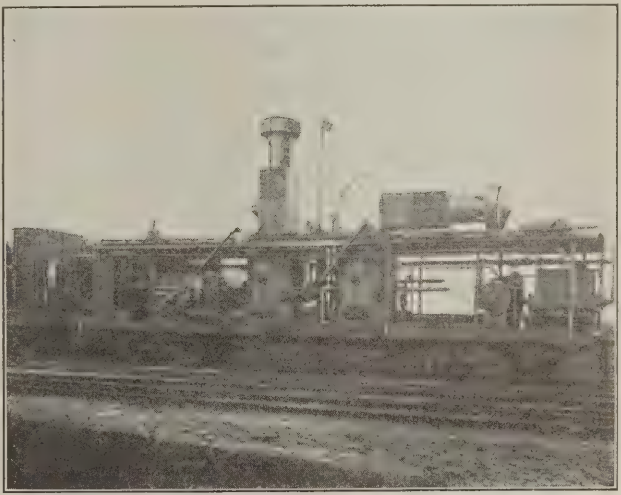


Fig. II—Hydrogen Gas Producer on Railway Truck.

The last two chambers of the settling pit are packed with coke, which acts as a filter and retains the last traces of impurities, so that the water may be run thence direct into any sewer or river. Soot is the only by-product of this process; the oil contains 80-85 per cent of carbon, of which the greater part is liberated; only a small proportion of carbon is found in

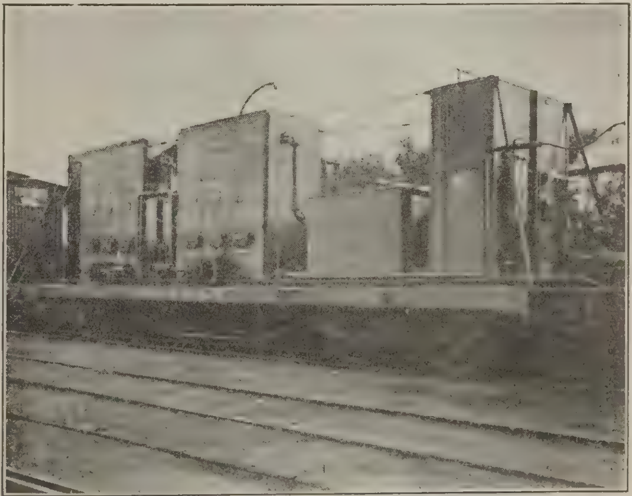


Fig. III—Purifying Plant mounted on Railway Truck.

the form of hydrocarbons and carbonic oxide in the crude hydrogen gas. Most of the liberated carbon is retained by the coke in the producers, and is later burnt by the air blast. A small proportion goes forward as soot in the gas, and is deposited in the hydraulic main and washer. The soot which collects in the settling pit when dried can be burnt under the boiler. The gas passes from the hydraulic main into a washer, where sprays of water remove the last traces of soot.

On leaving the washer the gas contains 6 to 8 per cent of carbonic oxide and sulphurated hydrogen. The latter is removed in a purifier charged with bog iron ore. The carbonic oxide is extracted by hot soda-lime in the following manner: The gas passes from the iron oxide purifier into thin-walled retorts, set in a furnace which keeps the soda-lime with which the retorts are charged at a temperature of about 300 degrees C. At this temperature the soda-lime absorbs the carbonic oxide from the gas. The gas thus purified is cooled by passage through an atmospheric condenser and is then stored in a gasholder. The purity of the gas is from 97 to 98 per cent, the residue being nitrogen. The specific gravity is 0.087 to 0.090.

The producers can be heated up for use in one to two hours, and can be operated continuously for a few hours at a time, or for days, weeks or even months.

An installation of this type and cost of production is quite expensive, and gas delivered in cylinders from a stationary plant is more satisfactory and preferable to a portable installation of this type, especially for the U. S. War Department. The layout of a portable installation of this process, as now used by the Governments of Germany and Russia, is as follows: The producers, with oil tank, oil pump, preheater and hydraulic main, are installed on one railway truck, and the purifying plant, including the washer and the final condenser, is arranged on a second truck. A gasholder constructed of balloon-fabric is carried on a third truck. The gas then passes from this holder to a compressor, placed on the fourth truck, by which it is compressed into steel cylinders.

(Part III)—Mr. Barnitz third and final article of this series will be "Linde-Frank-Caro Process—A Physical Liquefaction Water Gas Process," which will appear in an early number.

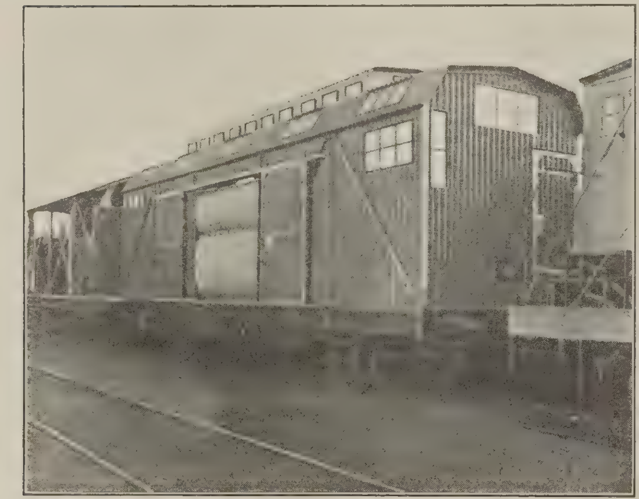


Fig. IV—Railway Truck containing Balloon type of Gasholder.

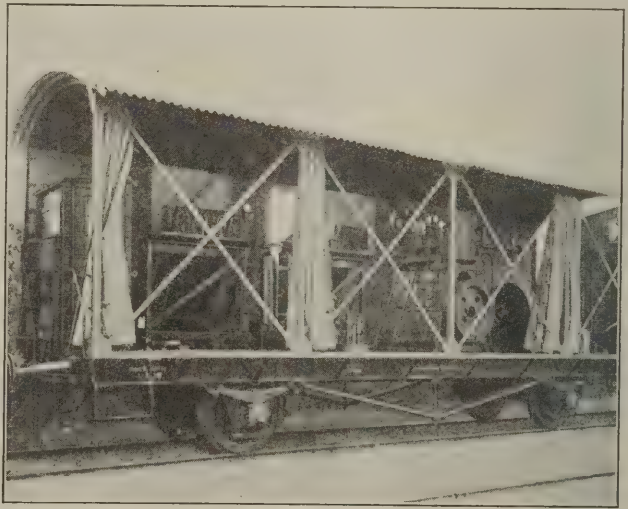


Fig. V—Railway Truck with Compressor.

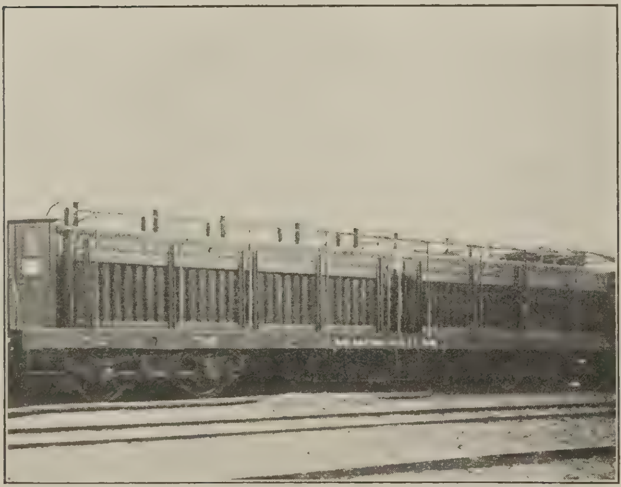


Fig. VI—Railway Truck with Steel Cylinders.

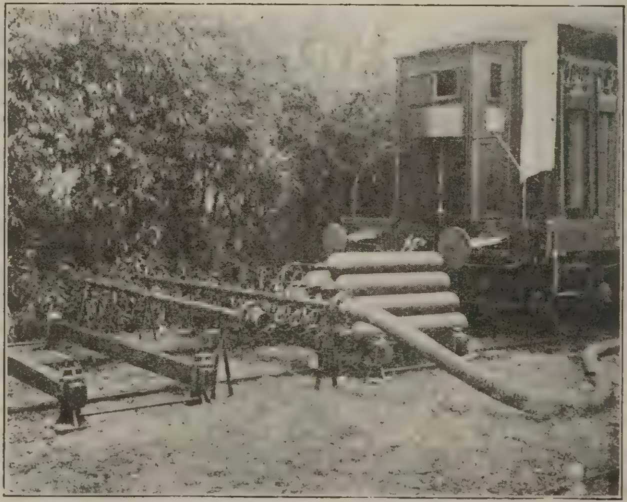


Fig. VII—Filling Cylinders on the Railway Truck.

FOREIGN NEWS

FRANCE

Captain de Beauchamp, of the French Aviation Corps, in revenge for the bombing of the open city of Amiens a few days ago, made a 473-mile flight across the Alps Mountains and bombed Munich on the 18th of November. The official account of the exploit is as follows:

"The aviator Captain de Beauchamp started this morning at 8 o'clock in the direction of Munich, where he arrived at noon. He dropped several bombs on the station in retaliation for the bombing of the open city of Amiens a few days ago. Captain de Beauchamp then landed at Santa Dona di Piave, in Italy, twenty kilometres north of Venice, after having crossed the Alps. The captain thus covered a distance of 700 kilometeres (437 miles)."

Mr. John F. Bass, the war correspondent of the New York *Globe,* sends in an interesting report of a visit to a French aviation camp. His account follows:

We drove out to the most famous aviation camp of France. To this escadrille are attached nearly all of the famous fighting aviators of France, which means practically the most expert airmen in the world. France today holds against Germany the undisputed sovereignty of the air. Aviation is playing an ever-greater part in the war. Aeroplanes not only have replaced cavalry in gathering information, but they have far outstripped the horsemen in any achievement in this direction in former wars.

The officer in charge of this escadrille explained the change that had taken place in aviation since the beginning of the war.

While we were talking small fighting machines arrived and left in groups of three and four. These machines of the latest construction had come to resemble birds more and more. Short of wing and light of construction they hovered over the field, dived and sank to earth with the ease and grace of the feathered inhabitants of the air.

Two machines are specially used for fighting, the Nieuport and the Spad. They are infinitely smaller, shorter of wing and more flexible than any machine in which men attempted to fly prior to the war. Unlike the German fighting machines, they only carry one man, who drives the airplane and at the same time by a lever on the steering rod operates the machine guns. The latter are placed either above the head of the aviator or in front of him, aiming out through the wooden propeller. A clever automatic device connects the machine gun with the motor of the airplane. In this way the discharges of the gun are timed so that the bullets pass between the blades of the revolving propeller without striking them.

Two kinds of machine guns are in use. One is the Lewis, of American make, which fires 100 rounds from a revolving disc. After this charge has been exhausted a new disc must be inserted in the gun by the aviator, who naturally has to drop his steering rod to do it. The second gun is the Hodgkiss, which fires 300 cartridges like any machine gun from a belt.

It is rumored that Sub-Lieutenant Nungesser, the best known French aviator, has left Paris for London in the hope that he will have the opportunity of bringing down a Zeppelin. Nungesser has brought down seventeen German aeroplanes, of almost every type, but has yet to experience the thrill that goes with bringing down a Zeppelin. It is said that he has been excused from military duty because of a recent wound and that this trip to London is of his own volition.

GERMANY

Lieutenant-General von Hoepper has been placed in command of the new aerial forces board of Germany, according to an Amsterdam despatch to Reuter's, quoting an official Berlin announcement.

The new board has control of all aviation and anti-aircraft requirements of the German Army, and has been formed in recognition of the increasing importance of aerial warfare.

Privy Councillor Schuette, professor of technology in the Danzig technical high school, is Germany's one, in fact, the world's only, competitor of Count Zeppelin in building gigantic airships. Count Zeppelin might be characterized as the invetnor, Schuette, on the other hand, as the scientific constructing engineer.

As compared with Zeppelin, he is little known, popularly speaking, even in his own country. Nevertheless, he is the designer and builder of airships which, it is declared, have shown themselves to be equal to the Zeppelins.

Without popular subscription, unsupported by the Government as was Zeppelin, Schuette, backed by Dr. Karl Lanz, a young millionaire manufacturer of agricultural implements in Mannheim, and by Privy Councillor August Roechling, a prominent steel and iron man, has worked quietly, modestly, but none the less energetically and successfully in the interests of his Fatherland and the fame of German science, by building, developing and adding many of the best aerial cruisers to Germany's rapidly growing fleet of super-dreadnoughts of the air.

Young Lanz, an enthusiastic friend of Schuette, had faith in the professor and staked a fund of half a million dollars on the latter's idea. He won a share, therefore, in the hypenated name of the rival airships to those of Zeppelin.

Working privately, Schutte has not sought the limelight, and neither Germany nor the world has heard much of him or his work. His airship is declared by enthusiastic friends and scientific engineers to be in some respects even superior to the Zeppelin, but his cruisers have passed and pass even among the German people as "Zeppelins."

Although Schuette only made a flight with his first airship in December, 1912, his second the following year, with a gas volume much larger than Zeppelin's, proved a big success. In less than five years he overtook Zeppelin, and some say even passed him. Schuette at least, set the pace in size and newness of design.

Since then Schuette and Zeppelin, in the friendliest rivalry, have been working neck to neck developing their respective craft, first one and then the other forging ahead. Under the impetus of the war the development of both Zeppelins and Schuette-Lanz airships, profiting by one another's experiences and lessons as gathered by the Ministry of War and placed at the disposal of each, has been phenomnal.

GREAT BRITAIN

"The British aviators trust that the German pilot of the Fokker aeroplane, which was shot down yesterday, was neither seriously injured nor killed."

This note was penned in English after a two-hours' wrangle in a British aviation camp over its phraseology and whether it should be written in bad German or good English. There was not one dissenter from the spirit of the message. The note was sealed up in a canvas bag and dropped behind the Turkish lines addressed to the "German Aviators."

The note was a return of a great courtesy. Some time ago a British aeroplane tumbled to earth behind the Turkish lines. Both pilot and observer were killed. A few days later a package was dropped into the British aerodrome from a Turkish aeroplane. Safely packed between two pillows were two watches, two cigarette cases, a ring, some other trinkets, and a letter, which in effect said:

"The German aviators with the Turkish Army regret the sad death of two very gallant hostile aviators. They return the personal effects of these brave men, thinking that their mothers would like to have them."

Who says there is no chivalry in modern warfare?

JAPAN

An exhibition of flight was given at Shimabara on the 1st inst. by Mr. Ito, a civilian aviator, the reclaimed ground in front of the Nampuro Hotel being chosen as the starting point. The first flight, says the *Nagasaki Press,* was made at 9 in the morning and lasted twenty-two minutes; the aviator flew partly over the sea and made a very successful demonstration.

A second flight was made in the afternoon, commencing ten minutes after 4. A false start was made, the aeroplane running into farm land almost as soon as it left the ground. This caused a half-an-hour's delay as the machine was slightly damaged. Mr. Ito again ascended and was flying beautifully over the sea when the machine suddenly dropped behind an islet, the spectators being made very anxious for the safety of the aviator. It was afterwards discovered that the aviator escaped injury by clever maneuvering when falling and he was picked up unhurt. The damage to the aeroplane was very slight.

A great number of people assembled at Shimabara to witness the flight, which was the first made in that district. Several special trains were run by the Shimabara Railway.

NORWAY

Lieutenant-Commander Kjell Nyegaard, of the Norwegian Navy, and Captain Hugo Sunstedt, of the British Navy, will make the first serious attempt since the war began to fly across the Atlantic.

Commander Nyegaard, who is a nephew of the Norwegian Minister to France, and a well-known aviator, is the organizer of the undertaking, which has the semi-official backing of the Norwegian Government. Until a month ago he was a lieutenant in the French aerial service, and has been thrice wounded during the war, the last time when he fell 2,000 meters, alighting in a tree, which saved his life. Before the war he was an attache at the Norwegian Ministry. He is a personal friend of the Crown Prince of Montenegro, and recently received a decoration from the Montenegrin King.

His companion, Captain Sunstedt, distinguished himself on the eve of the war by a record long-distance flight of 1,500 kilometres. On July 29 he started from Paris at 1 a. m., flying via Bremen to Stockholm, thirteen hours on a Maurice Farman biplane.

Scandinavian aviators intend placing an order in America for a Curtiss water triplane, to be constructed after their own designs. The machine is to have a wing expansion of 131 feet, a lifting capacity of 4,000 kilos, six driving motors of 160 horsepower each, a seventh generating motor, and an eighth motor to serve for working the motor boat in case of a forced descent in mid-ocean, in which case the wings would be cut away. Although there is to be seating capacity for eight persons, only two Scandinavian pilots and a mechanician are to undertake the flight with the aviators. The rest of the passenger space will be used for gasoline storage.

The triplane is to be ready in April for a trial flight. It is intended to start the transatlantic flight from Newfoundland, landing in Ireland, and flying as much as possible by night, which is easier for the two pilots, who as naval men are used to steering by the stars. Before attempting to cross the ocean the airmen purpose undertaking a preliminary 3,000-kilometer overland flight as a formal test of the machine's power.

Commander Nyegaard will be accompanied to America by his wife, formerly Mlle. Forzane, who was a Paris fashion expert for five years and was married to the Norwegian aviator a year ago.

RUMANIA

In the official Rumanian report for November 15th, it is claimed that hostile airmen are dropping bombs over the Royal Palace in the effort to kill the Queen and Princess of Rumania. However, it is reported that the Royal family has left the Palace. It is also claimed that enemy aviators on various occasions have flown over small cities and towns, deliberately firing their machine guns at the peaceful populace on the streets.

SWEDEN

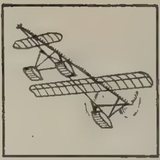
Stockholm, Nov. 13.—Dr. Erik Mjoberg, the Swedish explorer, who intends investigating the interior of New Guinea by means of a hydroaeroplane, leaves aboard the steamship Stockholm tomorrow for the United States, where he intends to lecture to raise funds for the exploit, and also to study the latest developments in the hydro-aeroplane industry. He has been granted three years' leave from his post as assistant director of the entomological section of the national museum.

Dr. Mjoberg's plan is to utilize a waterplane in soaring from the sea across the impenetrable jungle, alighting on the lakes in the mysterious center of the island, and thence conducting investigations with respect to the natives and the fauna of central New Guinea. The cannibals in that part of the great island rarely see white men, and then only on the outer fringes of their domains. It is fascinating to contemplate their amazement when Mjoberg volplanes into their midst of the royal village.

The explorer announces that he expects to make his base on an island in Geelvink Bay, on the northwest coast, as it is free from mosquitoes and miasmatic swamps. He hopes to use at least two water planes. A considerable proportion of the heavy expenses of the projected exploration has been raised by private subscription in Sweden, Norway, Denmark and Holland, including a substantial endowment from the "Travellers' Club." Mjoberg expects to remain six months in America.

MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



THE NATIONAL MODEL AEROPLANE COMPETITION

Illinois Model Aero Club Wins Villard Trophy for the Second Time

The National Model Aeroplane Competition ends with good results to the credit of those clubs which participated, especially to the Illinois Model Aero Club which club for the second time is the winner of the Villard Trophy. Many of the handsome cash prizes which were donated by the National Aeroplane Fund, of the Aero Club of America went to the leading flyers of this club. But although the Illinois Model Aero Club established its claim as the leading model club the honors of the competition do not entirely center upon the individual members of that club. Mr. Thomas Hall of the Illinois Club may have broken the worlds hand launched distance record for Model Aeroplanes, with a flight of 5,337 feet, surpassing Mr. Wallace A. Lauder's record of 3,537, but Mr. Frank Schober did equally as well although he flew another type of model. Mr. Schober broke the world's record for distance from the ground for compressed air driven models; his model having flown a distance of 432 feet. Mr. Schober is a member of the Aero Science Club and for a number of years has contributed his share toward the development of the compressed air motor in America with the result that his record will in all probability stand for some time to come.

The entrance of mechanically driven models into the National Model Aeroplane Competition indicates the possibility of rubber being substituted by mechanical motors of various kinds as means of motive power for model aeroplanes. During the National Model Aeroplane Competition considerable interest was shown toward the development of compressed air, gasoline, and steam engines for use in model aeroplanes.

It was through the efforts of Mr. Henry Woodhouse, a Governor of the Aero Club of America that the National Model Aeroplane Competitions of 1915 and 1916 resulted. Mr. Woodhouse is kindly disposed to the interests of the Model Flyers in America, many substantial prizes having been awarded by him for contests held during the past.

Final Results

Illinois Model Aero Club

					Total Club Av.
Distance from hand contests	April	1700.4	Oct.	613.7	2324.1 ft.
Duration from hand contests	May	56.6			56.6 sec.
R. O. G. Duration contests	June	83.6	Sept.	67.7	151.3 sec.
R. O. W. Duration contests	July	42.4			42.4 sec.
R. O. G. Distance contests	Aug.	538.9			538.9 ft.

Aero Science Club of America

Distance from hand contests	April	608.7	Oct.	651.7	1260.4 ft.
Duration from hand contests	May	65.2			65.2 sec.
R. O. G. Duration contests	June	35.8	Sept.	27.3	63.1 sec.
R. O. W. Duration contests	July	...			...sec.
R. O. G. Distance contests	Aug.	205.			250. ft.

Aero Science Club of America

(Power Driven Contests)

R. O. G. Duration	June	0 sec.
R. O. G. Duration	July	4.8 sec.
R. O. G. Distance	August	19.1 ft.
R. O. G. Duration	September	3.2 sec.
R. O. G. Distance	October	27.8 ft.

Texas Model Aero Club

Distance from hand contest	April	489.1 ft.
Duration from hand contest	May	9.4 sec.

Bay Ridge Model Aero Club

Distance from hand contest	April	232.8 ft.
Duration from hand contest	May	65.2 sec.

Pacific Northwest Model Aero Club

Duration from hand contest	May	53.0 ft.

Clubs	Total Ft.	Total Sec.
ILLINOIS MODEL AERO CLUB	2863.	250.3
AERO SCIENCE CLUB OF AMERICA	1512.3	136.3
TEXAS MODEL AERO CLUB	489.1	9.4
BAY RIDGE MODEL AERO CLUB	232.8	65.2
PACIFIC NORTHWEST MODEL AERO CLUB	00.	53.0

Note:—Club Averages only are considered in the above summary.

National Model Aeroplane Competition

September Contest

Duration Rising From the Ground

Illinois Model Aero Club

	Best Flight			Total	Average
William Schweitzer	41.	35.4	1.4	77.8	25.9
Willis Hitt	96.	72.6	46.	214.6	71.5
Ellis Cook	86.2	84.2	65.4	235.8	78.6
Jesse Railey	82.6	76.	68.8	227.4	75.8
Bruno Likosiak	88.	76.8	47.8	212.6	70.8
Lynn Davies	103.	99.6	48.2	250.8	83.6
Total				1219.0	406.2
Club Average					67.7

Aero Science Club of America

Mr. Charles W. Meyers	118.	112.	110.	340.	113.3
E. P. Lott	95.	58.	00.	153.	51.
Total				493.	164.3
Club Average					27.3

Aero Science Club of America

(Power Driven Models)

Fred C. Thiele	17.	12.	10.	39.	13.
Ellis Conklin	15.	5.	0.	20.	6.6
Frank Schober	0.	0.	0.	0.	
Total				59.	19.6
Club Average					3.2

October Contest

Illinois Model Aero Club

Distance From Hand.

William Schweitzer	3112	2550	1309	6971	2323.6
Ellis Cook	1872	905	000	2777	925.6
Joseph Lucas	1010	290	000	1300	433.3
Total				11048	3682.5
Club Average					613.7

Aero Science Club of America

R. Funk	1353	1176	922	3451	1150.3
C. W. Meyers	1975	1815	815	4605	1535.0
R. C. King	1922	1199	555	3676	1225.3
Total				11732	3910.6
Club Average					651.7

Aero Science Club of America

(Power Driven Model, Distance From Ground)

F. C. Thiele	158	151	99	308	102.6
Ellis Conklin	193	0	0	193	64.3
Frank Schober	0	0	0	0	0.0
Total				501	166.9
Club Average					27.8

On the Western Front: Experimenting with a model aeroplane constructed while in the trenches

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Ballade of the Comedie Writer.

(Thoughts of the Aeronitis Editor, when trying to think up some foolishness for the Aeronitis page)

But two more days remain to fill a page,
A page to cause our readers boundless mirth.
And yet the time goes on and humor wanes,
While Aeronitis thoughts have sped away.
For when one sits and tries to woo the muse
Of Humor:—if there's such a thing extant,
Life straightway loses all its joy and bliss
When all that comes to mind is tragic thought.
If I could find by searching far and near
The man—the fool—who first invented jokes
With joy the idiot's strangling would I watch
And never lend a hand to save his life.

To the Editor of that dear AERIAL AGE:

(Which rises to great high. Japanese joke.)

Dear Mr:

Doubtlessly you are wonder because you have not hear from me in such long time since announce great Aeroplane Race which are open to all rases including Japanese. Reason for these are as following: in first place for long time since I am cook in Russian Prison Camp, but to extent that finally quality of food I am serve donot agree with Russian soldier, and argument take place like latter, which follows.

Captain of Prison Camp, with name impossible to announce, say to me one day—(I leave out all works of Russian Swear) —"Togo," he say, "why all this disappointing cookery? I have heard Japanese were excellant house maid and cook, and when I agree with you, that in exchange for not having ball and chain around feet, you are to furnish home cooking to several occifers of Czar's Army, why you furnish food for eating which make even Child's blush for embarrassing?"

With much cleverness like man dodging bill collector, I make these response. "It are impossible to agree on quality of home-cooking."

"Why?" (he say this).

"My home in Tokyo, yours in saltish atmosphear of Syberia. Hence no agreement on which home are furnish cook-book for follow instruction Now after battle of Port Arthur"——

"Silence! (from him), do not dare mention such valuable defeat to noble soldiers of Czar!"

"Numb's the words," I expostulate, "never again mention of disaster shall be from me, I tell you those."

"Good news are thrust upon you—(his words)—on request from Aeronitis Editor of AERIAL AGE you are release in order to make entry for Great Aeroplane Race to be hold in those United States some time in future. As request accompany by slight check on well-known bank I am please to reply with demand. You are vanish at once."

After leave Prison Camp I at once go to Japan and start construction on aeroplane for race, entitled Fugyama, after ancestor who I am tell was quite high flyer.

Now trouble are just this: cousin Hiro Takahashi who complete education in Berlin, between drinks of beer, have a natural fondness for Zeppelins, but after experience of disaster with Zeppelins I have no more desire to leave Terra Cotta in such artical of flight. As Hiro possess much money, without which I am exist, trouble worry me very much, as having experience in aeroplane in those United States and prefer aeroplane to Zeppelin, but not having money to tell Hiro to remain from argument, so as Hon. Americans say, I must worry. At present am working out plans for combination aeroplane and Zeppelin which will agree with my desire and money of Hiro. When plans are finish I will send them with short descriptive matter in relation to plans. However, at present righting am feeling very laborious and unmentionable.

Hoping you are the same,

HASHIMURA TOGO.

[*Not by Wallace Irwin.*]

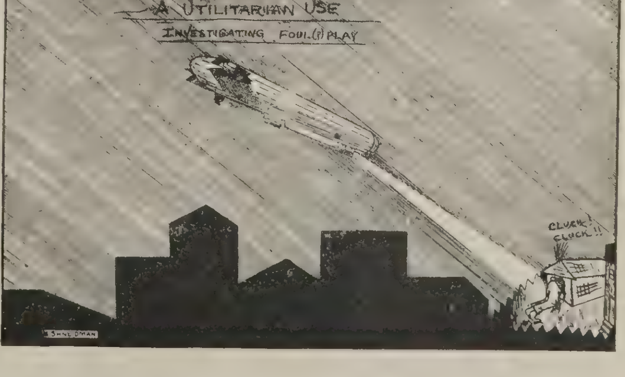
The following is George Fitch's idea of the aeroplane. If you think that it is funny, laugh; but we are not responsible for it:

The aeroplane was invented by Orville and Wilbur Wright in order to give man something to die for after the North Pole had been discovered and the unsafe and insane Fourth of July had gone out of style. Although it is only seven years since the first aeroplane flew over a fence, men are now falling out of them at a height of 10,000 feet and are getting $1,500 a day for doing it. They are sacrifices to the science of aviation and are the first men in history to make a good thing financially out of martyrdom.

It is too early yet to tell whether the aeroplane is to be classed as a vehicle, an exhibition, a weapon or a means of suicide. Sometimes it acts like all four of them combined. It is a delicate affair made of wires, tubing and canvas, is driven by a hurricane produced by a gasoline engine, and is operated by an aviator and a press agent. The aeroplane can fly 90 miles an hour and can remain aloft half a day. It can ascend at any desired speed, but frequently chooses its own speeds in coming down. Until this little matter can be regulated, aviation is not going to become much of a parlor game.

By means of the aeroplane, man has finally gotten the laugh on attraction of gravitation. He can rise from the ground at will, and can chase eagles, frolic in the zenith, play hide and seek with cumulous clouds and drop cigarette stubs carelessly down on Pike's peak, as he soars lazily by. He can skim over the forests like a chicken hawk, or can rise from earth so far that a Philadelphia-Boston baseball game below would sound only like a far volcano. But now and then the attraction of gravitation gets its laugh. There is nothing sadder or more tragic than the demoniac laugh of the attraction of gravitation.

Aeroplanes do not cost much money to build, and at present, owing to the good nature of city editors who do not change advertising rates for what they print, can be operated very cheaply. But the aeroplane will never become the poor man's toy, owing to the fact that part of the necessary equipment of an aeroplane is a 40-acre field for starting and stopping purposes. Until some means of mounting a 'plane from the curb is devised, they will not be handled by the department store to any extent.



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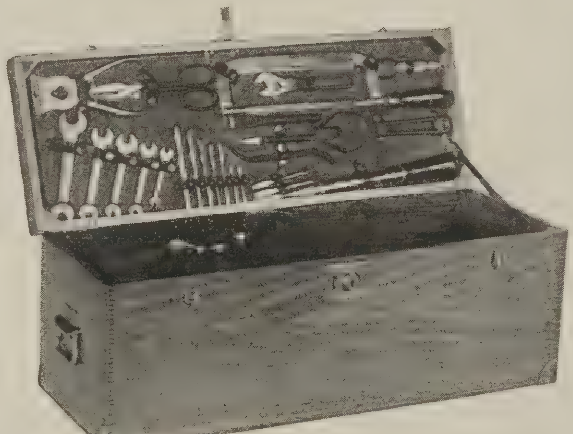

A Pilot's Necessity

THE accompanying illustrations show the compactness and completeness of the Cooper Aeronautical Tool Box. Complete with the assortment of tools shown on the lower diagram the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

After five years of flying experience these tools have been selected to meet every requirement for Aeroplane service. The size of the box is 28 x 9 x 10 inches.

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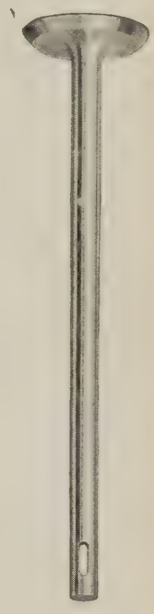

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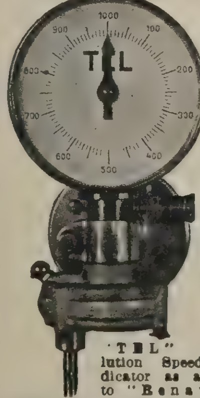

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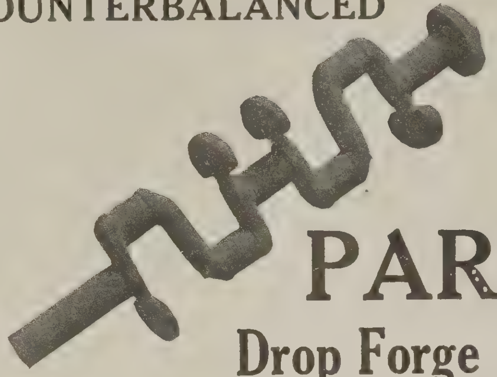

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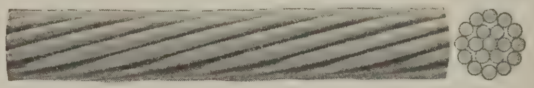

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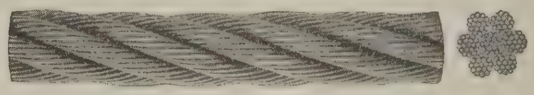

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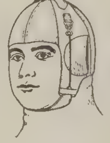

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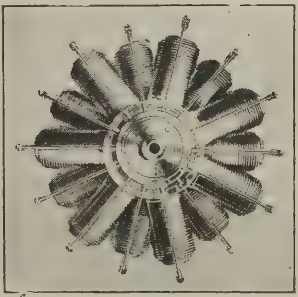

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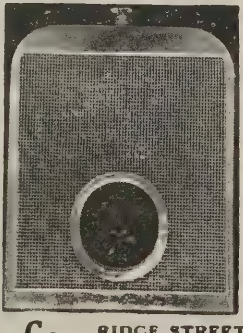

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MODELS—MODEL AEROPLANES, ACCESSORIES and supplies. Material suitable for the construction of models that will FLY. Moderate prices. Prompt deliveries. Complete catalog free on request. Wading River Mfg. Co., Wading River, N. Y.

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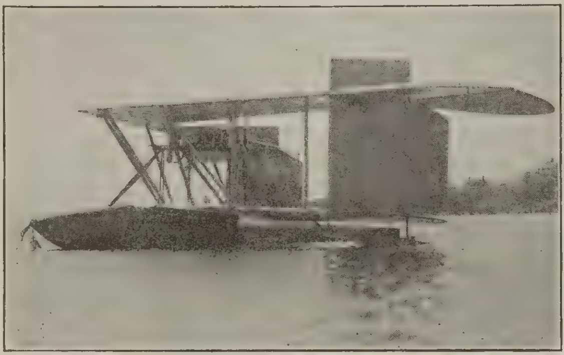

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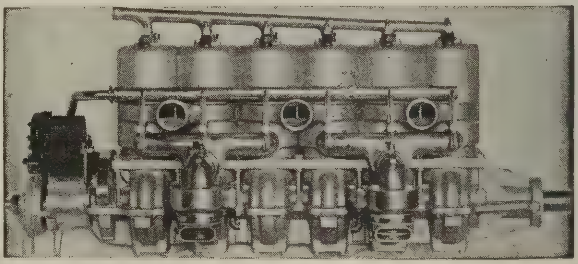

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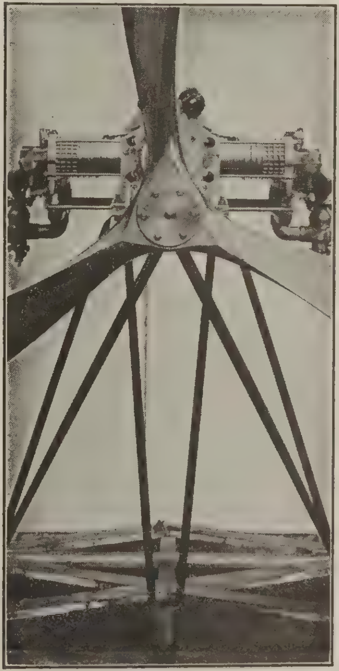

This photograph clearly indicates the small amount of head resistance of the entire power plant of the improved ASHMUSEN 12-cylinder, 105 H. P., self cooled aeronautical motor as mounted on one type of standard.

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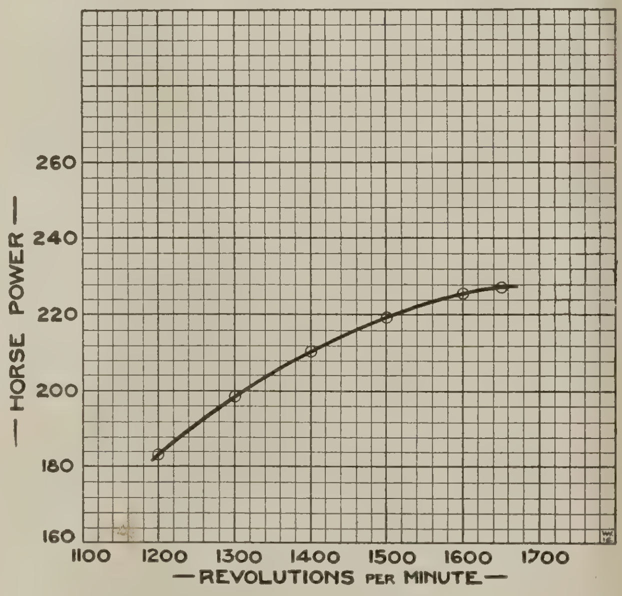
Curtiss

MODEL VX-3 motor was used by Victor Carlstrom on November 2nd in establishing the new American Cross-Country record, flying from Chicago to Erie, Penna., a distance of 452 miles, in 3 hours 57 minutes.

Owing to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

CURTISS AEROPLANE & MOTOR CORPORATION

BUFFALO, N. Y.

AERIAL AGE

WEEKLY

UNIVERSITY

VOL. 4, No. 12 DECEMBER 4, 1916 10 CENTS A COPY

To Make America First in Aeronautics—By A. R. Hawley

Aeronautics in Relation to Naval Architecture—By Naval Constructor H. C. Richardson, U. S. N.

The Beecher Horizontal Aeromotor Described

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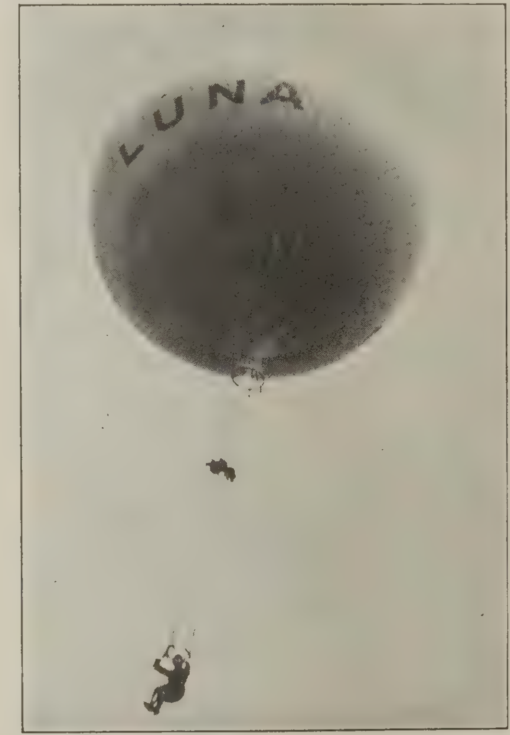

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THE FIRST PAN-AMERICAN AERONAUTIC EXPOSITION

Grand Central Palace, New York,
February 8th to 15th, 1917
TO FOLLOW THE AUTOMOBILE AND MOTOR BOAT SHOWS

Held Under the Auspices of

The Aero Club of America
The Pan-American Aeronautic Federation
The American Society of Aeronautic Engineers

THE preliminary announcement of the plans of the First Pan-American Aeronautic Exposition has created such tremendous interest, and so many requests for space have been received, that the original plans are being extended and the show space is being doubled.

The Exposition will afford the opportunity to show the tremendous progress that has been made in American Aeronautics in the past two years.

The people of two continents will come to the Exposition to see what the American Aeronautic Industry has produced for National Defense, utilitarian purposes and sport.

The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos - Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

APPLICATIONS FOR SPACE SHOULD BE ADDRESSED TO

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AERIAL AGE
WEEKLY

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Vol. IV New York, December 4, 1916 No. 12

TO MAKE AMERICA FIRST IN AERONAUTICS—CONSTRUCTIVE PROGRAM OF THE AERO CLUB OF AMERICA

By ALAN R. HAWLEY, President Aero Club of America

AMERICA is to be first in aeronautics in the not distant future. This conclusion, reached by those of us who are close to aeronautic developments, is not based upon a belief that we shall secure immediately the aeronautic equipment that we lack for our national defenses, but upon inside knowledge of the extensive resources that we have, which are being developed at a tremendous speed.

The lines of development of American aeronautics are many, and it would take a book to tell about them all. Besides, some of the most important developments cannot be made public. These include remarkable aeroplanes and motors being built, plans for establishing air lines in the United States and South and Central America to develop our aerial defenses and for extraordinary aeronautic events.

It is the knowledge of the achievements of hundreds and the plans of thousands of people that leads us to believe that America is to be first in aeronautics in the near future.

Have Largest Motors

Progress in aeronautics in this country is, indeed, so fast that everything seems possible. It is often our experience to have people come to us or write to us deploring the fact that we have not in this country motors of large horsepower and large or very fast aeroplanes such as they have in Europe, and we take great pleasure in informing them that we have motors of higher horsepower and larger and faster aeroplanes than they have in Europe.

For instance, there are, to our knowledge, a half dozen different types of motors ranging between 125 horsepower and 400 horsepower, and as many different types between 80 horsepower and 125 horsepower. Some are better than others, some are being tested, some about to be tested. We have at least one—but would probably have no trouble in getting many more—type of aeroplanes capable of a speed of 125 miles an hour, and another capable of lifting fifteen tons. The only shortcoming is, perhaps, the usual lack of shop "finish." But this is rapidly being overcome.

We know, of course, that we lack in round figures about 2,000 aeroplanes, 25 dirigibles and 150 observation balloons to make this country seventh among nations in aeronautic equipment for national defense. A half dozen countries have between 2,000 and 9,000 aviators. Statements made in the House of Commons show that England is rapidly drawing near to her announced intention to have 10,000 aeroplanes in service, which means the acquisition of between 30,000 and 40,000 aeroplanes a year. We have only about 100 trained military aviators and plan to train about 400 more in the near future.

Congress May Provide

Congress has already shown its interest in aeronautics. Substantial developments have taken place since Villa's raid on Columbus brought out the fact that we had only eight aeroplanes available to meet an emergency. The public awoke to the realization that it was a shameful thing to have allowed the country of Langley, the Wrights, Curtiss and other pioneers to lag behind even the smallest countries and their colonies in this new and most wonderful art and science. It demanded action and Congress allowed close to $18,000,000 for aeronautics for our land and water defenses. This sum permits taking steps to establish a substantial air service; it permits training between five hundred and one thousand aviators for the Army, Navy Militia and Aerial Reserve Corps. The Congressional leaders have stated that they are in favor of advancing this work as fast as possible, and will allow the additional funds for equipping whatever number of aviators the Army and Navy may train. The appropriation of the last year was made essentially for training aviators.

Pledged to Get One Thousand Aviators

This country is pledged to get 1,000 aviators as soon as possible. There is general appreciation of the fact that if we had 5,000 trained aviators this country would be in the position of a porcupine, which goes about ready to defend itself. These 5,000 aviators can be obtained and can be employed every day for useful purposes in mail carrying, coast, guard service and other utilitarian pursuits. The post office is ready to establish aeroplane mail carrying service in 200 localities. That will easily involve using 1,000 aeroplanes. The great interest taken in aeronautics by men of means during the last year leads us to believe that there will soon be thousands of men using the aeroplane, not only for the convenience and faster transportation which the aeroplane affords, but also to create a reserve of aeroplanes which will be available for national defense.

Five Thousand Aeroplanes Within Two Years

Considering the great interest that is being taken in aeronautics by the general public at the present time and the many possibilities for the employment of aeroplanes for general purposes, I dare say that it is possible that we will make 5,000 aviators within the coming two years. There are 19,000,000 men of military age in this country, and there is evidence that a large percentage of these men will learn to fly as soon as they get the opportunity. The Aero Club of America and its thirty constituent aero clubs have received thousands of applications from young men who are eager to learn to fly and to become part of the aerial defenses of the nation. The splendid work of Aerial Coast Patrol Unit No. 1, which was organized by F. Trubee Davison, Robert A. Lovett, H. P. Davison, Jr., and nine other patriotic Yale men, and the fine showing of the twenty-six Harvard graduates during the last season have created great interest among college men. The accomplishments of aircraft in the last three years have made the needs of universities and colleges realize that aeronautics affords splendid opportunities for the young men who are now in the universities and colleges fitting themselves for active life. The Aero Club of America has taken steps to introduce aeronautics in the universities and colleges and has met with very substantial responses. There are approximately one thousand universities and colleges in this country, with a total of about 1,200,000 students. The Aero Club of America has offered medals of merit, to be awarded to the three students in each of the hundred largest universities and military schools who write the best essays on aeronautics.

Efficiency of American Motors

The lack of long distance cross country flights has been largely responsible for creating the impression that American aeroplanes and American motors are not equal to the best European products. That has been due entirely to our need of aviators and the other conditions which caused the postponement of the transcontinental aeroplane contest. But the army aviatos with the Mexican expedition, the flights of Miss Ruth Law and Victor Carlstrom from Chicago to New York, of Lawrence B. Sperry from New York to Boston and from Marblehead to New York, and of Sergeant William Ocker from New York to Philadelphia and the other flights early in the year from Newport News to New York and New York to Washington have given conclusive evidence. The flight of twelve aviators to the Princeton football game, mostly aviators who have taken up aviation for national defense, was in itself a very conclusive evidence of the progress made during the last year.

Army and Navy Orders

There is also evidence of substantial progress being made in building up the aeronautic branch of the Army and the Navy. The substantial orders placed and being placed for aeroplanes, motors and aeronautic equipment will do much toward upbuilding the aeronautic industry, not only creating a substantial course of supply of aeronautic equipment for national defense, but also affording encouragement to the industry which will lead to important developments and corresponding improvements in aeroplanes and aeronautic motors.

In short, America is to be first in aeronautics because our aeroplanes and our aeronautic motors are as efficient as the best European product, our aviators are as good as any, our people and the press are thoroughly appreciative of the wonder of human flight; our need for aerial defense is as extensive as in any other country; we have more possibilities for the employment of aircraft for transportation than any other country; we have more sea coast, lakes and rivers where one can use flying boats for sport and passenger-carrying than any other single country; there has been more attention given to aeronautics by civilians in this country than in an other country; we have 19,000,000 young men of military age, the majority of whom, if a vote were taken, would be shown to wish to take up aviation. And there is no gainsaying that we have more ingenuity and spirit of enterprise here than anywhere else.

Will Make America First

These many resources are in the incipient stage of development. We see these evidences of possibilities, but the results are not yet fully accomplished. It will require about two years for continuous close co-operation, with general encouragement from those who are in a position to encourage, such as the government, the press and the aero clubs. We feel sure that this co-operation will be given.

It is to be hoped that the Council of National Defence, which was created by Congress especially fo the purpose of developing relations between the government and the patriotic organization and the industries, and has the power to bring about the co-ordination of aeronautic resources, will take steps to bring about the co-ordination of the aeronautic resources. This is undoubtedly American aeronautics' greatest need.

Considering all these things, we feel that America is to be first in aeronautics.

Problem of Getting Dirigibles

It is true, of course, that we have not yet any dirigibles in operation in the United States. But the army and navy both seem willing to co-operate with private concerns which are willing to do the pioneer work of building them. Among the concerns disposed to be pioneers in building dirigibles are large shipbuilders who are used to speedy production and have most of the factors needed to make a success of airship building.

This country needs dirigibles for national defence and for utilitarian purposes and we believe that the American public will approve the action of the army and navy in placing orders for four large dirigibles with different concerns to force this development without loss of time.

If only two out of four should be successful the nation would be amply compensated. The problem that has delayed the placing of orders has been the fact that it is impossible to estimate the cost of building a large dirigible, doing the amount of experimental work necessary to develop an efficient airship. But there are patriotic concerns willing to undertake the work at cost, and this seems to be the best solution of the problem.

The Martin Stabilizer

THE details of an extraordinary invention intended to eliminate "slide slipping" and "skidding" in the air was brought out by the application made by the inventor of this device at the Aero Club of America for the Collier trophy which is awarded annually for the greatest achievement in aviation in America, the value on which has been thoroughly demonstrated by use during the preceding year.

The invention is known as the Martin Aerodynamic Stabilizer and consists of a combination of small vertical and horizontal planes which are attached at the ends of the top wings and are operated by a small weight which operates them while the aeroplane is in flight. Tests have been made with a military aeroplane with the usual ailerons sealed equipped with this simple device and the report states that the aeroplane equipped with the Martin Aerodynamic Stabilizer would not skid or slip in the air.

The lateral control of an aeroplane heretofore has been maintained by moveable wing tips called ailerons, which are turned up or down as the aeroplane flies and the pressure of the air striking the wing tip turned upwards presses it down and striking the one turned down presses it upward and this pressure brings the aeroplane to an even keel. These wing tips are connected to the steering gear by wires and are operated by the pilot. In the case of the Martin Aerodynamic Stabilizer there are no wires, the auxiliary planes of the stabilizer operate automatically according to the motions of the aeroplane, always tending to bring it to an even keel.

When the first tests of this device begun at Mineola, Long Island, on November 6th, it was the first time that a man had ever flown an aeroplane, the lateral controls of which were not connected to the steering gear in some way.

The inventor of this aerodynamic stabilizer is Captain James V. Martin, a veteran in aeronautics, who was the organizer of the Harvard-Boston Aviation Meet in 1910 which was the first international aviation meet held in the United States and resulted in bringing to the United States Claude Grahame-White and other European aviators.

Next week we will present to our readers a complete illustrated description of the new device, and will print the official report of the tests.

Ruth Law

(Editorial in N. Y. Globe)

RUTH LAW, birdwoman! Perhaps you don't know it, and it is highly probable that you don't care, but you're Ruth Law, feminist, too. You're the practical sort of feminist that is going to do more for women than a decade of front parlor and lecture room talk on "sex barriers" will ever do. For, Ruth Law, you didn't just sit down and talk. Oh, no; you went and donned your flying clothes, and you went and sat yourself down in your little baby biplane, old-fashioned and queer, and you shifted a few levers and made a couple of moves with your booted feet, and there you were, sailing off into the blue, past the mist, past the fog, past the clouds, out into crisp November sunshine and the glory of flight.

You didn't make a bit of a fuss about it, Ruth Law. The joy was in the doing, and you went to work without fuss or feathers, and you did it.

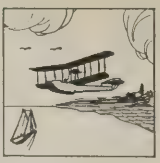
There isn't, it would seem, much that women can't do in the same way if only they set their mind to it. Of course, it's exemplified right in the homely little household things every day. Father is to hang a picture, and he gets a stepladder and sends son down cellar for a hammer and some one else to the storeroom for the tacks, and then they all stand about holding the picture and the wire and the utensils, and at last the picture is hung—crooked. And the next day mother wants a picture hung, and she steps on a chair and drives in a tack with the back of a hairbrush, and right away the picture is hung—straight.

The woman that can do things simply and efficiently and completely, like the woman who hangs the picture, and Ruth Law, who has won the American non-stop 'cross-country record, is the best sort of practical feminist.

Last Hundred Miles to Pole by Aeroplane

Captain Roald Amundsen, the discoverer of the South Pole, arrived in New York on November 27. He announced that he intends using an aeroplane to complete the last 100 miles of his effort to reach the North Pole. His expedition will set out from Norway in July, 1918.

THE NEWS OF THE WEEK



BIDS FOR 148 SEAPLANES

The War Department on November 23, opened bids for 148 military hydroaeroplanes for use for coast guard defense service.

The bids were as follows:

Buffalo Aeroplane Company, Buffalo, N. Y.—Four machines at $18,475 each, eight at $17,975 each, twelve at $17,735 each, sixteen at $17,400 each, thirty-two at $16,400 each, sixty-four at $15,000 each, eighty at $14,520 each; one to be delivered in ninety days and two every fifteen days thereafter; machines to attain altitude of 6,500 feet in ten minutes; maximum horizontal speed not less than 90 miles an hour.

Aero Marine Engineering and Sales Company, New York—Four machines at $19,000 each, eight at $18,500 each, twelve at $18,000 each, sixteen at $18,000 each; first to be delivered in 100 days, one every twenty days thereafter; to attain altitude of 3,000 feet in ten minutes; maximum speed 75 miles an hour.

Albert Heinrich, 141 Broadway, New York.—Four machines at $14,850 each, eight at $14,100 each, twelve at $13,365 each, sixteen at $12,875 each; first to be delivered in seventy days, one every sixteen days afterward; to attain altitude of 4,000 feet in ten minutes; maximum speed 85 miles an hour.

E. F. Gallaudet Company, Norwich, Conn.—Four machines at $28,110 each, eight machines at $26,800 each, twelve machines at $26,435 each, sixteen machines at $26,140 each, thirty-two machines at $25,920 each first to be delivered in 120 days, two every thirty days thereafter; to attain altitude of 5,090 feet in ten minutes; maximum speed 85 miles an hour.

Wright-Martin Aircraft Corporation, New York, (alternate bid,)—Twelve machines at $26,275 each, sixteen machines at $25,486 each, thirty-two machines at $24,656; first machine to be delivered in 150 days, one every two days thereafter.

L. W. F. Engineering Company, College Point, N. Y.—Eight machines at $22,500 each, twelve machines at $21,500 each, sixteen machines at $20,250 each, thirty-two machines at $19,000 each; two to be delivered in 120 days, one to three every seven days thereafter; to attain altitude of 4,000 feet in ten minutes; maximum speed 75 miles an hour.

Curtiss Aeroplane Company, Hammondsport, N. Y.—Made flat bid to deliver any quantity or all asked for at $22,500 each; first to be delivered in sixty-five days, three every seven days thereafter; to attain altitude of 2,000 feet in ten minutes; low speed 48 miles, high speed 65 miles an hour.

Benoist Aeroplane Company, Sandusky, N. Y.—Four machines at $14,800 each, eight at $14,700 each, twelve at $14,600 each, sixteen at $14,500 each, thirty-two at $14,200 each, sixty-four at $13,800 each, eighty at $13,600 each, ninety-six at $13,200 each, 112 at $12,800 each, 128 at $12,400 each, 148 at $12,000 each, first to be delivered in seventy days, one every seven days thereafter; to attain altitude of 3,200 feet in ten minutes; maximum speed sixty-five miles an hour.

Wright-Martin Aircraft Corporation, second bid—Twelve machines at $29,497 each, sixteen at $28,624 each, thirty-two at $27,752 each, sixty-four at $27,124 each, eighty at $26,800 each, ninety-six at $26,499 each, 112 at $26,249 each, 128 at $26,000 each, 148 at $25,800 each; first to be delivered in 150 days, one every two days thereafter.

Burgess Company, Marblehead, Mass.—Six machines at $12,000 each, twelve at $11,500 each, eighteen at $11,250 each, twenty-four at $11,000 each; two to be delivered in eighty days, one every seven days thereafter; to attain altitude of 3,000 feet in ten minutes; maximum speed 75 miles.

Standard Aeroplane Corporation, New York and Plainfield, N. J.—Four machines at $22,500 each, eight at $22,500 each, twelve at $22,000 each, sixteen at $22,000 each, thirty-two at $21,000 each, sixty-four at $20,000 each, 148 at $20,000 each; first to be delivered in twelve weeks, one a week thereafter; altitude 3,500 feet in ten minutes; maximum speed 80 miles an hour.

Cohen Motor Company, New Britain, Conn.—Four at $25,700 each, eight at $25,250 each, twelve at $25,050 each, sixteen at $25,000 each, thirty-two at $24,250 each, sixty-four at $23,750 each, eighty at $23,150 each; two to be delivered in eighty-five days, one every fortyfive days thereafter; altitude 2,500 feet in ten minutes; maximum speed 75 miles an hour.

New York Aeroplane Construction Company, New York—Four at $24,000 each, eight at $23,700, twelve at $23,400, sixteen at $23,000, thirty-two at $22,600, sixty-four at $22,200, eighty at $21,800, ninety-six at $21,400, 112 at $21,000, each, 128 at $20,500, 148 at $20,000 each; first to be delivered in ninety days, one every fourteen days thereafter; altitude 2,600 feet in ten minutes; maximum speed 75 miles an hour.

Field Officers U. S. Army to Get Aviation Training

Six ranking field officers in the army began, on November 20, a course that will last for six weeks at the U. S. Army Aviation School, at North Island. Under the direction of Captain H. Le Roy Muller of the school, they will be instructed in the use of the aeroplane in army service, movements of an aero squadron and will generally familiarize themselves with the construction and management of the flying units that may be attached to their commands.

Among the students in the first class are Colonel William Kenley, sixth field artillery; Major J. B. Bennett, eleventh infantry; Lieutenant Colonel C. H. Bishop, eighth field artillery; and Major Brooke Payne, sixth field artillery.

Congressman Flies to Washington

O. D. Bleakley, of Franklin, Pa., elected two weeks ago to be a Representative in Congress, arrived in Washington November 20 in an aeroplane. He made the flight from Philadelphia, owing to the fact that the rugged country around Franklin made it too dangerous to start from there. He is the first Representative-elect or elected who ever has come to the capitol by air.

Mr. Bleakley is sixty years of age. He said that in all probability he will use the air route exclusively in going between Washington and home. Sergeant William C. Ocker, of the Army Aviation Corps, drove the machine to Washington. He is instructing Mr. Bleakley in the art of flying, and believes that the lawmaker soon will be able to go it alone.

On reaching Washington the aeroplane was driven over the White House, which it circled two or three times, and then swooped gently down in Potomac Park, near the Washington Monument.

"I am convinced that aerial navigation soon will be a popular recreation," said Mr. Bleakley. "I used to think the automobile was wild and dangerous. I am not sure that we shall return by our aeroplane to Philadelphia. I have business to attend to here for a day or two. I have had one of the best times in my life, and if it isn't too cold when Congress convenes I may return in my aeroplane."

Harvard Flyers for Army Reserve

Several of the Harvard undergraduates who qualified for pilot licenses after two months of training at the Curtiss School of Aviation at Buffalo have decided to apply for commissions in the Federal Officers' Aerial Reserve, under the regulations recently announced by the War Department.

The men who have decided to apply are Francis I. Amory, Jr., of Boston; Frederic S. Allen, of Pelham Manor, N. Y.; Edmond E. Bates, of Melrose; W. Bartlett Bacon and Hamilton Coolidge, of Brookline; Donald D. Harries, of Minneapolis, and Harry H. Metcalf, of Westboro.

Organize Aero Club in Hawaii

Interest in things aeronautical has spread to our insular possessions, and the Aero Club of Hawaii has been organized, and Brigadier General Robert K. Evans is the president, while Queen Liliuokalani, the Governor of the Territory and the commandant of the naval station at Pearl Harbor are among the members, and the club has applied for affiliation with the Aero Club of America.

The club starts with a membership of 186. At the present time there is not a single aeroplane or observation balloon in Hawaii, in consequence of which the coast artillery of that place is virtually blind and would be at the mercy of long range guns aboard vessels beyond the vision of observers stationed in the forts.

It was in appreciation of General Evans' efforts on behalf of aerial preparedness that the Aero Club of America appointed him a governor of the club at the recent elections. General Evans took great interest in aeronautics when he was in charge of the Department of the East, and subsequently when stationed at Laredo, Texas, he promptly organized the Aero Club of Texas. When the Aero Club of America instituted the National Aeroplane Fund, General Evans contributed to it, and the officers of his staff and even the enlisted men of his command did the same.

1918 Navy Budget Is $400,000,000—$5,133,000 for Aeronautics

The 1918 Naval Appropriation Bill will probably be one of the first great supply bills ready for consideration in the House when Congress convenes next month. It will carry a total of nearly $400,000,000.

Rapid progress was made by the House Naval Sub-committee doing preliminary work on the measure.

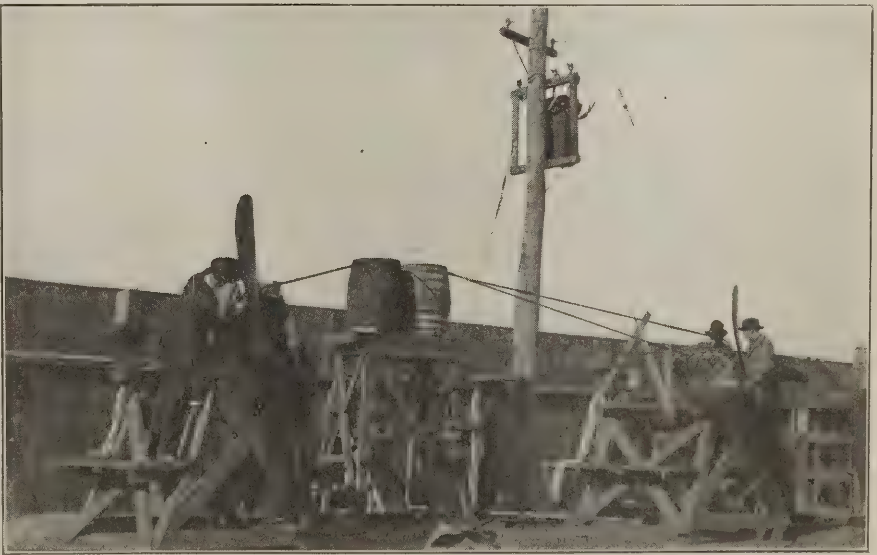
Admiral Griffin told the committee that American aeroplane and submarine constructors were developing rapidly satisfactory engines. He saw no reason why the performance of European craft of both types could not be equalled. His own bureau, the Admiral said, had about completed plans for a 500 horsepower aeroplane engine.

$5,133,000 is asked for naval aeronautics.

Naval Aeronautic Base at North Island?

The Navy Department has announced that all available units of the Pacific Fleet will be assembled at San Diego, Cal., the latter part of this month during the visit of the naval commission, headed by Rear Admiral James Helm.

The naval board, it is understood, will consider the proposal to establish a permanent naval aeronautical training base at North Island, in conjunction with the present Army Aviation School, and also will look into the matter of constructing a supply and submarine station in adjacent territory.



The outdoor testing stands at the Army aviation field at Mineola where all motors are tested before being installed in the Army aeroplanes.

Allan S. Adams, one of the instructors at the U. S. Army Aviation School at Mineola, who tested the Martin stabilizer recently.

Army and Navy Orders

First Lieutenant HENRY W. HARMS, aviation officer, Signal Corps, to Ithaca, N. Y., for temporary duty in connection with aeronautics at the plant of the Thomas Brothers Airplane Company. (Nov. 10, War D.)

First Lieutenant WALTER G. KILNER, aviation officer, Signal Corps, to College Point, Long Island, N. Y.; for temporary duty in connection with aeronautics of the Army. (Nov. 13, War D.)

Lieutenant (J. G.) Z. G. LANGSDOWNE, to naval aeronautic station, Pensacola, Dec. 29.

Lieutenant (J. G.) G. S. GILLESPIE, detached inspector aeronautic material, Boston; to assistant to inspector engineering material, Brooklyn, N. Y.

Leave of absence for one month on completion of test for junior military aviator granted Firt Lieutenant GEORGE E. LOVELL, Jr., Cavalry, detached officers' list.

Captain HOLLIS LE R. MULLER, Coast Artillery, to San Diego and report to commission office Signal Corps aviation school for temporary duty in connection with field officers' course in aviation.

Lieutenant (J. G.) W. M. CORRY, detached naval aeronautic station, Pensacola; to Washington.

FROM LEFT TO RIGHT: COLONEL GLASSFORD, CAPTAIN CULVER, LIEUTENANT BARTHOLF.

Capt. C. C. Culver, U. S. A., stationed at the Signal Corps Aviation School at North Island, San Diego, Cal., has been making a special study along the line of sending messages from a 'plane to a land station over a distance of 105 miles, and has also perfected apparatus by which he has succeeded in picking up messages sent from one 'plane to another over a distance of ten to fifteen miles. Col. W. A. Glassford, U. S. A., is in command of the school. Lieut. J. C. Bartholf, U. S. A., has qualified as military aviator.

Invitation by Aeroplane

The students of the University of Chicago have asked Mary Pickford to attend their winter dance and reception. The invitation was sent by aeroplane on the trip from Chicago to New York, made by Aviator Victor Carlstrom. Miss Pickford attended a dance of the summer students last July.

The American-Made 150 H.P. Hispano-Suize Motor

The Wright-Martin Aircraft Corporation has a contract order to supply the French Government with a quantity of aero motors, built to the specifications of the much discussed Hispano-Suize (Spanish-Swiss) motor, and under their contract the manufacturers are prohibited from releasing photographs of it. Data, too, has been withheld, and very little has been published concerning it. According to Mr. James E. Diamond, chief engineer of the Aluminum Castings Co., the Hispano-Suize aluminum engine as put in production in Europe nearly two years ago is now being produced in quantity in several plants in France and in two plants in Italy.

Some of the few points that have recently come to light are that the motor is rated at 150 horsepower at 1,450 r.p.m., although actually developing 155 brake horsepower at its rated speed. It is of the "V" type with eight cylinders which are cast *en bloc*. Overhead camshafts are entirely enclosed in a cast casing, which covers and protects the valve operating mechanism, at the same time keeping out foreign substances and retaining a good supply of lubricating oil. A continuous supply of oil is force-fed to all parts of the motor.

Bore 120 mm (4.72 inches) by 140 mm (5.51 inches). Clandel carburetor. Two Splitdorf magnetos for running the motor and one Westinghouse magneto used in connection with the starting device. Starting is affected by the employment of a hand crank with a reduction gear and a starting magneto.

Weight, complete with starting magneto and hand-cranking reduction gear, 410 lbs. Without the above, 20 lbs. lighter, or 390 lbs.

Reception for Miss Law

An impromptu reception by the leading aviators and aeronautic authorities was tendered to Miss Ruth Bancroft Law at the Aero Club of America, Nov. 23. Being known that she would call at the Club at three o'clock, the aviators and leading aeronautic authorities called at the Club to congratulate her. Among those who called and those present to give her a hearty welcome and congratulate her were: Alan R. Hawley, President of the Club; Henry A. Wise Wood, Evert Jansen Wendell, Henry Woodhouse, Charles Jerome Edwards, Governors of the Club; Augustus Post, Professor David Todd, Glenn L. Martin, Vice-President, the Wright-Martin Corporation; G. Douglas Wardrop, Editor of AERIAL AGE; W. D. Judkins, Vice-President, the Standard Aero Corporation; Stuart McDonald, manager, The American Trans Oceanic Company; Victor Carlstrom, the aviator whose non-stop, cross-country flying record Miss Law bettered; J. Guy Gilpatric, aviator; John D. Cooper, President of the Cooper Aeroplane Company; A. Leo Stevens, the veteran aeronaut, who is now instructor and inspector in the United States Army lighter-than-air section; W. S. Bonney, aviator; Ladislas d'Orcy, W. W. Niles, Farnum T. Fish, the aviator; George L. Larabee, George H. Guy, Arthur Johns, Edward F. Searles, and Lyman J. Seeley.

Miss Law was felicitated on her achievement and for her grit. Mr. Hawley, speaking for the officials of the Club, stated that her achievement was a fitting climax to a year of substantial developments in American aviation.

The aviators were unanimous in saying that if Miss Law made this record without previous experience in cross-country flying, they would have to watch out for their laurels during the coming year, when she would get some practice! The $20,000 prize which the Aero Club of America will offer for the Transcontinental Aeroplane Contest, they said, was very much in danger of being carried away by Miss Law!

Aeroplanes for Exploration

Dr. Eric Mjoberg, a Swedish explorer, who arrived recently in New York on the steamship Stockholm, said he came to the United States to study the latest inventions in aviation preparatory to making arrangements for an exploration trip into the interior of New Guinea. He said he expects to use aeroplanes in this expedition to a large extent, his plans at present being to take with him four machines, to carry ten men.

The date of the starting of the expedition has not yet been decided.

Air Cruiser Tested

David H. McCulloch, pilot of the new seaplane of The American Trans Oceanic Company, of which Rodman Wanamaker is the head, made a thirty-five mile flight November 21 in a stiff wind and for the first time used the "automatic pilot."

He said he was confident the craft would be ready soon to make almost any journey and he is trying to arrange for a flight to Boston or to Newport. Weather conditions alone will govern the definite time of the start. Mr. McCulloch will go out over Manhasset Bay and then follow the Sound all the way to Boston, a flight that he believes will cover roughly about 260 miles. Mr. McCulloch thinks he can make the distance in from four to four and a half hours. He will be accompanied by the four men who have been assisting him constantly and the same who made the flights November 21. They are Lawrence Sperry, inventor of the gyroscope stabilizer, and the other pilot of the "flying cruiser," as Mr. McCulloch calls it, Brice H. Goldsborough, gyroscope man; Stephen Goodrich and L. E. Perry, the mechanics.

Rhode Island Militia Student to Train at Pensacola

Five members of the First Aeronautic Section, Rhode Island Naval Militia, which was organized with the funds raised through the efforts of the Aero Club of America, called at the Club recently to advise the officials of the Club that the Navy Department has arranged to allow them to take a course of training at the Naval aviation station at Pensacola, Fla. They started for Pensacola this afternoon on the Clyde Line, after being entertained at luncheon by the officers of the Club at the Club House.

The First Aeronautic Section, Rhode Island Naval Militia, bought an aeroplane last summer with the $7,500 which was contributed for that purpose, through the Aero Club of America by Miss Lyra Brown Nickerson, who died recently. Altogether, there was contributed to the Rhode Island Militia for aviation purposes over $22,000.

The Section did some able work during the past season, and the action of the Navy Department in arranging for the training of five of its members under the expert direction of naval aviators will insure making of these five men, who are Ensign J. K. Park, Jr., C. J. Whitford, in charge; R. N. Estey, G. B. Pray, and H. M. Fallon, efficient aviators.

The Aero Club of America officials heralded this action of the Navy Department as evidence of a new progressive policy on the part of the department. The Naval Militia of the twenty-two states having such organizations, have been anxious to organize an aviation section, and applied to the Navy Department during the past year for aviation training for members of the proposed aviation sections. Unfortunately, the Navy Department had not asked for appropriations for that purpose, and Congress had been governed by the Department's recommendations. But the past Congress made provision for the training of members of the Naval Militia in aviation, and the matter of training Naval Militiamen depended entirely on the Navy Department making the necessary arrangements. The authorizing of the five members of the First Aeronautic Section, Rhode Island Naval Militia to take the course at the Naval Aviation School at Pensacola is the first indication that the arrangements for training Naval Militiamen have now been made.

The Aero Club officials expect that quite a number of Naval Militiamen will avail themselves of the opportunity presented to learn to fly and then organize aviation sections in the Naval Militia. It is hoped that the Navy Department will arrange to train the members of the First, Second and Third Naval Battalions of the New York Naval Militia and of the New Jersey Naval Militia, who are anxious to take the course of training and become proficient in naval aeronautics.

Lieut. John H. Towers, the veteran Naval aviator who has been a naval attache connected with the American Embassy in England, and has had an excellent opportunity to see the tremendous aeronautic developments abroad, is now in charge of aeronautics in the Navy Department at Washington. The Aero Club officials, like the naval officials, expect great things from Lieut. Towers in the development of both the heavier than air and the lighter than air branches of naval aeronautics.

Three Fly to Yale-Harvard Game

Three of those who saw the Yale-Harvard game last Saturday arrived from Mineola, L. I., by aeroplane. They were aided by a high wind all the way and made the sixty-five-mile flight in time to arrive for luncheon.

Lieutenant Alexander Blair Thaw, of the First Signal Corps, New York National Guard, made the flight. He was to have been accompanied by his brother, William Thaw, a Lieutenant in the French Flying Corps, but the latter decided at the last moment not to make the trip.

The other two flyers were C. H. Reynolds and his mechanician.

The flyers landed on a field near the bowl without trouble, but all were stiff from the cold.

During the game one of the planes soared above the crowds, taking pictures of the thousands below, who, needless to say, were highly interested in the manoeuvers.

Capt. Muller to Teach Superiors to Fly

As one of the instructors of the newly authorized field officers' training class, Captain Hollis Le R. Muller, commander of the Twenty-ninth Company, Coast Artillery Corps, at Fort Winfield Scott, has left for the San Diego aviation school.

The first class will consist of officers with the rank of major or higher, who are to be fitted for executive and administrative positions in the aviation section.

Captain Muller, a West Point graduate, is one of the youngest captains in the army. He learned to fly at San Diego, and holds the army altitude record.

Report of Undergraduate Aero Training Fund

That the Undergraduate Aero Training Fund's initial plunge into the instruction of Harvard students in the flying game met with more than the success anticipated by its founders is evident from the committee's report made public and sent to the five hundred odd subscribers. Of the seventeen men who were sent to the Curtiss, Wright and Thomas schools, twelve have qualified for their pilot's license, four have not yet completed their course of four hundred minutes in the air, and the seventeenth was unable to attempt his flight to qualify for the license before the opening of college because of the weather conditions. Speaking of the success of the ten men who attended the Curtiss school and each of whom qualified for his license the report says:

The men who completed their course are now desirous of additional training to qualify them as expert military aviators. Recent legislation at Washington has provided for an aerial reserve. Whether or not the War Department will take advantage of this legislation in such a manner as to make it practical for these Harvard men to become members of this reserve is still a matter of conjecture.

The committee is now endeavoring to get co-operation from the Government. Whether or not in the opinion of the committee the work should be continued another year depends largely on the attitude of the Government in regard to the further training of the men who have already qualified as pilots.

The committee wishes to express its appreciation of the interest extended by the sponsors, of the generous financial support of the Aero Club of America, graduates and others, and of the assistance and valuable advice given by those interested in the movement. Also the committee especially appreciates the co-operation of the schools and instructors, and above all else—the earnest, unfailing energy, patience and determination of those undergraduates who devoted their summer to this work, and who are primarily responsible for the results obtained.

ROGER AMORY, '10, Chairman.
ALLAN FORBES, '97.
GORDON H. BALCH, '12.

The financial statement follows:

Contributions	$9,028.06
Aero Club of America and Robert Bacon	500.00
Undergraduate deposits	900.00
Interest and bank balance	12.08
Total	$10,440.14
Tuition and equipment	$7,835.41
Administration	845.74
Refund of deposits	600.00
Exchange charges	1.50
Cash balance	1,157.49
Total	$10,440.14

Export of Aeroplanes

Since our last report the export of aeroplanes and parts has been as follows: To Great Britain $27,524.

Pennsylvania News

The dangers confronting the United States from lack of military preparation were presented before a large audience at a meeting of the Engineers' Club of Trenton, N. J., by Joseph A. Steinmetz, president of the Aero Club of Pennsylvania.

The lecture was made most interesting by the exhibition of aeroplane models and many stereopticon views.

The club members are very much interested in the report that the War Department may establish an aviation school for civilians near Philadelphia. A short time ago Major Mitchell of the United States Aviation Corps made a trip to the Philadelphia School of Aviation at Essington to ascertain the facilities there for flying.

Major Mitchell accompanied by Geo. C. Thomas, Jr., one of the directors of the school made a long flight over the Delaware river with Walter E. Johnson, chief instructor at the school and expressed himself as much pleased with the conditions at Essington.

Wardrop Lectures Before Important Organizations

During the past two weeks G. Douglas Wardrop, editor of Aerial Age, has aroused much enthusiasm amongst the members of important organizations by his lectures on aeronautical progress and activity.

On November 9 the students of Pierce School, the large business training institution in Philadelphia, were told of the opportunities that aeronautics held for them; on November 17 some 300 engineers, prominent in many phases of mechanical and civil activity, were amazed at the story of progress; on Tuesday afternoon the students at the School of Journalism of Columbia University were told how, as future editors, they could constructionally co-operate to develop aeronautics, and on the evening of the same day the members of the University Forum of America marveled at the story of "Aircraft in Retrospect and Prospect."

On November 23 Mr. Wardrop had one of his most enthusiastic meetings when he addressed the members of the University Club of White Plains. Many of the leading members are seriously considering taking up the sport next summer as a result of his talk.

On November 28 the Huntington Branch of the Brooklyn Institute of Arts and Sciences were informed by Mr. Wardrop of the romance and importance of the "War in the Air."

Garden City News

Out on Hempstead Plains, where the wind cuts like a knife with nothing to stop it, officers and enlisted men of the United States Aviation Corps are experimenting with both wartime and peaceful flying despite the cold.

During the last few days they have been testing great bombs, dropping high explosives from a height of two and three thousand feet. As a result the Government has on file to-day a satisfactory report showing the great destructive power and wide killing radius of a new device.

This latest weapon of the sky is the Barlow bomb. It has been proved effective. Under the supervision of Col. Gatley of the Field Artillery, Capt. Ragsdale of the Ordnance Department and Capt. Carberry, in command at the Government aviation grounds, the aero bombs were loaded aboard one of the "school" military biplane. Lieut. Rader was pilot and Lieut. Wheaton was official bomb dropper. No attempt was made to hit a mark. The Hempstead Plains are broad and barren. Each bomb was locked in a metal case.

Lieut. Rader drove his machine up into the wind in a wide encircling crawl. At a height of 2,000 feet Lieut. Wheaton released a bomb, case and all. This is what happened:

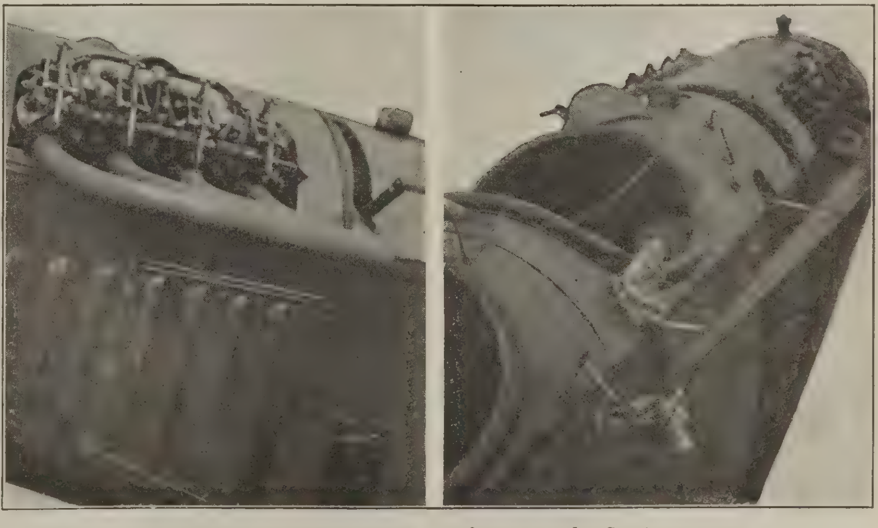
The case, looking not unlike a heavy length of pipe about three feet long—though it could not be seen in the descent—plunged into that section of Hempstead Plains from which everything had been cleared away.

An instant later a small earthquake aroused the residents of Hempstead and nearby towns. In striking, the butt of the case had released the bomb, which was attached to the case by a string seven feet long. The bomb shot up in the air again the length of the string, seven feet, and there the backward tug pulled the trigger, which exploded the bomb. Had there been shrapnel in the bomb it could have killed any one standing a quarter of a mile away.

Pyrotechnic signalling with Roman candles and other kinds of fire is making the sky over Hempstead a heaven full of shooting stars and comets. Twice daily the Eagle's fledgings are taken up in the air and taught how to fly. Four instructors while away the hours between flights delivering lectures on the thousand and one things military aviators ought to know.

Word has been passed around the field that in the near future the department at Washington, D. C., will order the Hempstead corps to make flights to Washington. Preparations are now being made. Every machine is being overhauled and tuned up. A stop will be made at Philadelphia to replenish the supply of gasoline. Otherwise, the army aviators say, they could make the entire journey, including the return trip, without touching earth.

The generator equipment of the biplane used by Capt. Culver in his recent wireless tests at San Diego.



Two views of the new muffler attachment to the Curtiss motor.

Alaska's New Resource—Aeroplane Timber

The steady growth of aeroplane manufacturing has developed a new Alaskan resource—Sitka spruce—which promises to become one of the most sought products of the great northern territory.

The Forest Service, by a series of experiments, has demonstrated that Sitka spruce, which is almost entirely indigenous to Alaska, is better adapted to the exacting demands of aeroplane manufacture than almost any other variety. Alaskan lumber mills have sold more than 1,000,000 board feet of this wood.

Wood which goes into the manufacture of planes must be of a quality which will hide no defects or weaknesses and which will be strong under all conditions of service. Other woods, while strong and serviceable, sometimes conceal hidden defects beneath a smooth outer surface.

There has long been a question whether the spruce of Alaska was of equal quality with that of Washington and Oregon and some parts of West Virginia. All three varieties combine lightness of weight with great strength, but for several years a prejudice seemed to prevail against the variety from Alaska.

Sitka spruce is a west coast product. Thus far the commercial output of Alaskan spruce for aeroplane building has been handicapped owing to the tremendous demand on northern lumber mills for box lumber. Box material contracts have been too voluminous to leave much of this wood for aeroplanes.

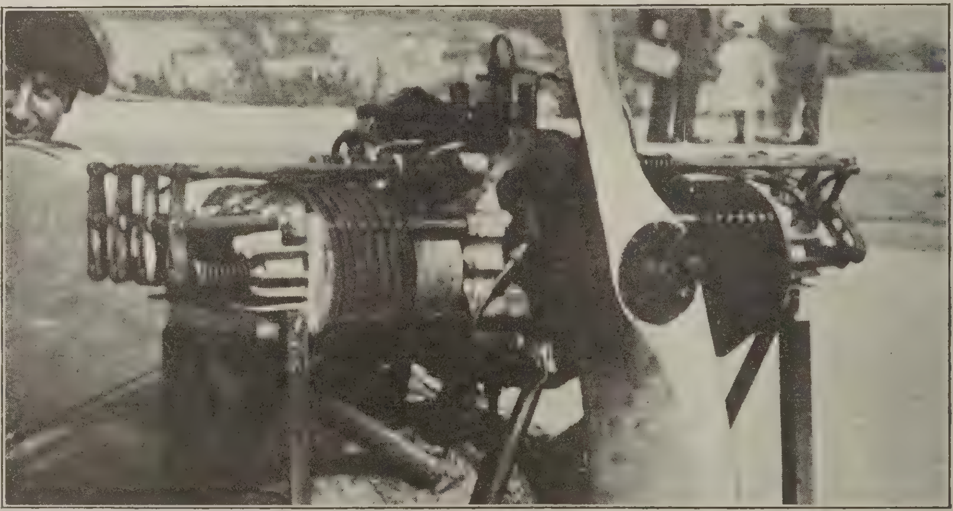
The planes of an aeroplane are usually of laminated construction, the posts, beams or ribs being constructed of strips of wood glued together to form a solid piece. This gives the structure greater flexibility than could be obtained from solid pieces of material. Nails are avoided in the construction of aeroplane frames.

Another point of aeroplane construction where the strength and dependability of the product figures largely is in the beams, which are usually 16 feet long and run lengthwise. The grain of these beams must be straight throughout, for a grain running diagonally through the strip will greatly lessen its strength.

Spruce also enters largely into the construction of aeroplane propellers, but usually in combination with other varieties of wood. The best combination for this purpose, according to manufacturers, is spruce, mahogany and ash. The central layer is usually of ash, with a layer of spruce on either side, then a layer of mahogany and two thin strips of ash on the outside.

Altogether, spruce comprises about 60 per cent of the wood used in aeroplane construction in this country and abroad. At this time there are said to be millions of board feet of spruce of the best quality in the Tongas National Forest in Alaska. Individual trees of first quality spruce, growing on this tract, have attained a diameter of six feet and a height of 200 feet. Real utilization of the spruce supply in the Alaskan national forests has practically not begun.

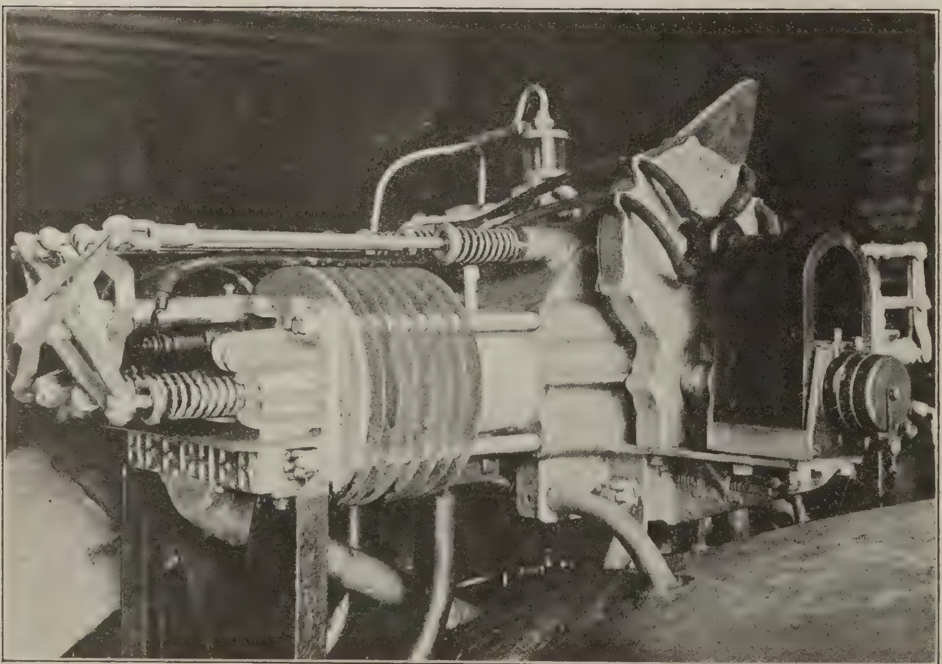
THE BEECHER HORIZONTAL AEROMOTOR



For the past year, Mr. Eugene L. Beecher, of New Haven, Conn., has been testing and experimenting with a small motor of the horizontal opposed type. The motor was built while Mr. Beecher was in Galveston, Texas, and it incorporates a number of new features in design and construction.

Mounted on an automobile chassis with a streamline body, the motor was tested with a two-bladed propeller having an 8-foot pitch, 4 feet in diameter, revolving at 1,200 r.p.m. It is claimed that the "Wing Wagon" made 100 miles an hour, giving an idea of the power to be expected when installed in an aeroplane.

There are four cylinders, bore 3¾ inches by 4-inch stroke. Cylinder heads are detachable. Six rods go through the crankcase, from head to head, holding the cylinders in place. Push rods and rockers are returned by a spring, leaving the valve spring free of this work. A peculiar feature of this motor is the crossed rocker arms on one side. This ingenious arrangement permits the use of a single camshaft with only four cams operating eight valves. Nothing in the motor is offset.



There are but two main bearings, two camshaft bearings, two gears and only two connecting rod bearings. These are not the forked type or side by side, but are gudgeoned similar to the Gnome. Even the magneto has no gears, the distributor being driven from the camshaft. One of the illustrations shows the neat manner in which the sparkplug wires are held, leading from the distributor.

At present Mr. Beecher is designing an eight-cylinder motor, having eight cams, and thirty-two valves, which will substantially follow the design of the four-cylinder motor.

AERONAUTICS IN RELATION TO NAVAL ARCHITECTURE*

By Naval Constructor H. C. RICHARDSON, U. S. N.

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THE most intimate point of contact between aeronautics and naval architecture exists in the design of floats for aeroplanes, and I shall confine this paper to that subject although the question of stream line forms and the pressure and flow of air on such forms and on flat and cambered surfaces is also closely related to naval architecture.

Early in 1911 work was started at the model basin at the Washington Navy Yard, with a view to the development of floats for aeroplanes. This work has been constantly followed up by making tests of model floats of all descriptions, and particularly with models of floats actually furnished, or proposed, for use with naval aeroplanes. In addition to this, series of models embodying variations of particular features were tried from time to time, covering a wide range of possible useful features, and, where such models showed sufficient merit, full-size construction has been carried on, and the full-size floats have been given tests in actual service. A detailed account of the complete series of tests would be too voluminous for reproduction, and would cover many defective types, so that I shall enter only into a general discussion of types and the requirements for floats for naval aeroplanes.

It appears well to point out at once the differences existing between the conditions of use of aeroplane floats, and those met in the use of ordinary displacement vessels, or vessels of the hydroplane type. The principal differences arise from the fact that as the square of the speed increases the lifting power of the wings becomes more and more important, and the load carried by the aeroplane float constantly diminishes until at the get-away speed no load is any longer carried by the float. At the higher speeds near the get-away conditions, the form of the bottom of the float becomes unusually important, due to a prominent suction effect which is present if any downwardly bowed lines of flow are presented.

It might readily be imagined at first thought that what proves the best type for hydroplane hulls would naturally be the best type for aeroplane floats, but the reason just mentioned may operate seriously against certain types of hydroplanes for aeroplane use, for the hydroplanes themselves constantly carry the same load, whereas aeroplane floats carry a diminishing load, are consequently less deeply immersed, and, therefore, present in general a different set of lines to the flow of the water than is the case with hydroplanes. Besides this, a hydroplane is never projected suddenly at high velocity into the water with any lateral velocity. This, however, is frequently the case with aeroplane floats, which must be able to make skidding landings, or get-aways, across the wind without danger.

The most prominent effect of the special conditions of operation of aeroplane floats is that of the greatly reduced resistance at high speeds. Plate A indicates decided differences existing under ordinary displacement conditions, and the conditions governing the use of aeroplane floats. On this plate curve **A** represents the resistance of a simple hull of constant displacement. Curve **B** represents the resistance of the same hull run at displacements corresponding to speeds. Curve **C** is the same hull as that for curve **B**, but is fitted with submerged blades; while curve **D** shows a typical resistance of a twin step float run at displacements corresponding to speed. The great advantage, so far as resistance is concerned, due to the lift of the wings, is clearly apparent from an inspection of these curves, and the addition of submerged blades clearly increases this advantage so far as resistance is concerned. But the performance of such blades is decidedly tricky, and although they have been used in a few instances they are considered tricky and unsatisfactory and unsuited to use in rough water.

A matter of considerable interest is that two different states of flow may be encountered at the same speed, depending on the manner in which the speed is approached. Thus, an aeroplane getting under way will require full power to attain the planing condition at about 25 miles per hour. However, once planing speed has been attained, it is possible to ease off the power very decidedly and still maintain planing at a lower speed.

When using water blades to assist in planing, a critical condition appears, and, if the blades are heavily loaded, this causes a sudden failure of lift as the blades approach the surface. When this happens the flow suddenly breaks from the back of the blade, causing a sheet of spray to rise at about 60 degrees to the surface of the water, and this appears to be independent of the sharpness of the edge of the blade itself. Following this failure in lift, the float then settles quickly until the original flow is re-established, when the blade again lifts as before and proceeds to follow the cycle of performance just described.

The suction effect referred to was discovered in an attempt to reduce frictional resistance of the float to a minimum by the use of a parallel middle body having semi-circular midship sections with ogival ends. This form behaved admirably at moderate speeds, but when the get-away condition was approached, the model, instead of planing, indicated a strong suction effect and proceeded to lift sheets of spray well clear of the surface. Finally, at the get-away condition, with the model counter-weighted to a zero displacement and just in contact with the surface, the suction influence of the curved bow and buttock lines was sufficient to drag the float down into the water until the deck was flush with the original surface, and a complete glassy sheet of spray was lifted several feet clear of the surface of the basin. The resistance was abnormally high. This effect in modified form has been found in several types of floats and in several instances has produced failure of designs, or seriously affected their performance.. The effect may be readily understood by suspending a spoon, holding the end of the handle lightly between the fingers, and then letting the bottom of the bowl of the spoon touch a stream from a hydrant.

Having considered the special conditions which affect aeroplane floats, as distinguished from those affecting displacement forms, let us now consider what is required of aeroplane floats.

When adrift the floats must provide buoyancy and have sufficient reserve of buoyancy to provide against loss due to a damaged compartment.

Sufficient water-line inertia and freeboard are required to provide initial and reserve stability in a strong wind in the open sea. This problem is unusually difficult, because of the unusually high position of the center of gravity and of the requirement of keeping the wings and propellers well clear of the surface, and of keeping the center of gravity close to the center of lift. Those inclinations produce a rapid movement of the center of gravity, which must be exceeded sufficiently by the resultant change in the center of buoyancy. Sufficient initial stability must exist to provide against the force of the wind on the extended wings, which may be rolled to strong lifting angles.

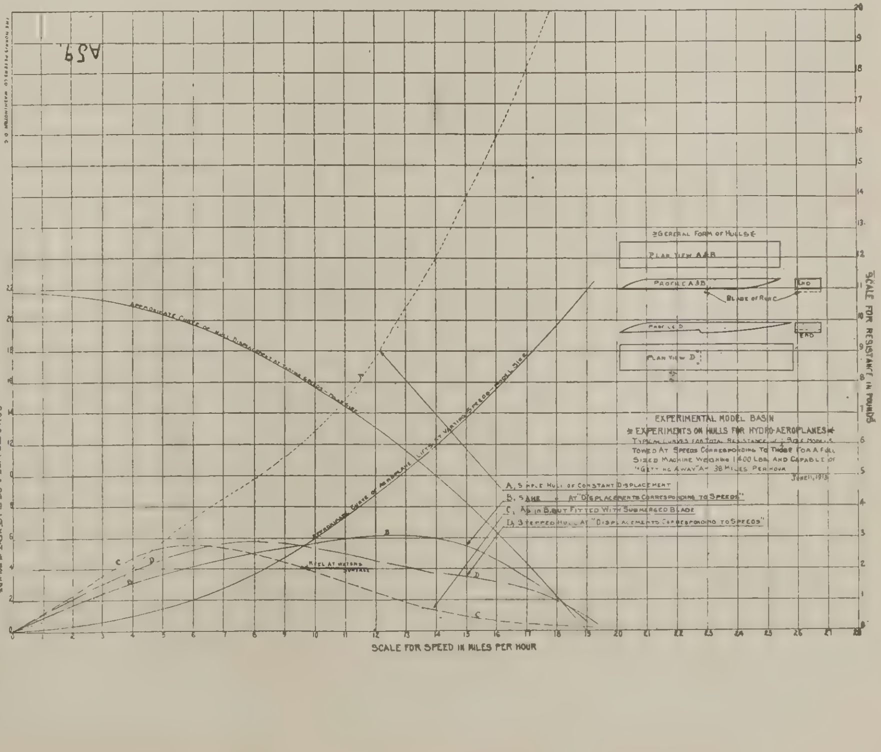
When drifting it is desirable that the aeroplane should head into the wind. This is difficult to attain by control of form and may require the use of a sea anchor.

Under way at moderate speeds the aeroplane must steer readily in all directions and be able to maneuver in close quarters so as to get alongside the ship.

Water rudders are not always successful on such short floats as are usual, and are objectionable from handling the stowage points of view. If the water rudder is a part of the air rudder, action becomes confused in a cross wind, and sharp handling is necessary when the water rudder breaks clear of the surface.

Under way at high speed, particularly near the get-away speed or landing speed, the bow must have sufficient bearing power to prevent nosing under in a rough sea or a badly judged landing. The form must also be such as to avoid undue pounding and the throwing of spray into the propellers.

In order to avoid the requirement of excessive power to drive the floats, planing should begin at moderate speeds—in the neighborhood of 25 miles an hour in a calm. Planing is readily attained by the use of large areas of planing bottom, but too rapid planing is not desirable, and a compromise is required because of the different water speeds involved when getting away in a calm or when heading up or down wind. If too much planing is present, the aeroplane may be tossed off rough water at less than flying speed, or before the air controls become effective. This always results in severe pounding and may cause the aeroplane to return to the surface in a dangerous atti-



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* Read at the twenty-fourth general meeting of the Society of Naval Architects and Marine Engineers, held in New York, November 16 and 17, 1916.

tude. If after planing is attained the attitude of the float relative to the surface can be modified, the wing can also be modified, and the actual get-away becomes controllable within limits. This latter feature is very desirable.

When getting away or landing, it is extremely desirable that the forces acting on the floats should be moderate and act with small moment arms about the center of gravity, so as to introduce moderate disturbing forces and require a minimum use of the air controls and maintain the proper attitude of the aeroplane.

In the air the floats should present a minimum resistance and interfere as little as possible with the flow of air to the supporting surfaces and the air controls. They also should not introduce disturbing influences on the center of pressure of the aeroplane, as this is also involved in the equilibrium of the aeroplane in flight.

All of the preceding qualities must be attained to as high a degree as practicable in floats, which at the same time must be rugged enough to stand severe punishment on the surface and still be of the lightest possible construction. The solution is necessarily a compromise. Buoyancy and stability require forms and dimensions which conflict with the best aerodynamic forms and the requirements of moderate resistance and weight. Planing in flight also requires a form of bottom which does not readily meet stream line requirements.

At the model basin at the Washington Navy Yard, a speed of over 15 knots is available; this admits of the use of one-ninth size models for a get-away speed of 45 miles per hour, and this size model is generally used.

The first condition to be provided is that of loading the model to the displacement corresponding to the speed. The assumption is made that the lift of the wings increases with the square of the speed. This is only approximately correct, but serves well for the purposes of comparison. It is not exact, for the attitude of the aeroplane is dependent on the amount of air control existing, and whether it is sufficient to overcome or modify the effect of the forces acting on the floats and thus obtain control of the angle at which the air surfaces act. As these effects cannot be anticipated, or the control be determined or applied, this assumption does not appear unreasonable, and the comparison of model and full-size performance appears to justify this and the other assumptions made.

The model is usually set at a trim of 3° by the stern from the normal water line, as numerous experiments indicated this to be the average condition. A direct comparison was made of a one-quarter size float under the artificial conditions assumed and the same float fitted to a model aeroplane to the same scale. Except at low speeds, where the tip floats, which are not used in model tests, introduced increased resistance, and at high speeds where the complete model was not under flying control, the agreement was very satisfactory, and at the point of maximum resistance, which is of the greatest interest, was practically in exact agreement.

The models are first towed from a parallel motion system, which allows the model to rise or fall under the influence of the planing or suction effect while maintaining a constant trim relative to the surface. The rise or fall from the initial condition is recorded and indicates the planing power of the model. The gear is so arranged that the model is readily counterweighted to the desired degree for each condition.

Plate B is a complete record of test No. 1844. This test is that of a model of a twin-float design of a 2,000 pound aeroplane. The model was one-ninth size and the corresponding speeds, therefore, were one-third those for the full size. Get-away was assumed at 45 miles per hour.

Curve **B** shows the gross resistance of the model and towing gear, and curve **C** the net resistance of the model.

Curve **D** shows the change in trim at each condition due to the planing power.

Curve **F** shows the modification of the resistance curve when the model is towed free to trim, the model pivoting about a point corresponding to the relative position of the propeller thrust.

Curve **G** shows the water-planing power for this condition.

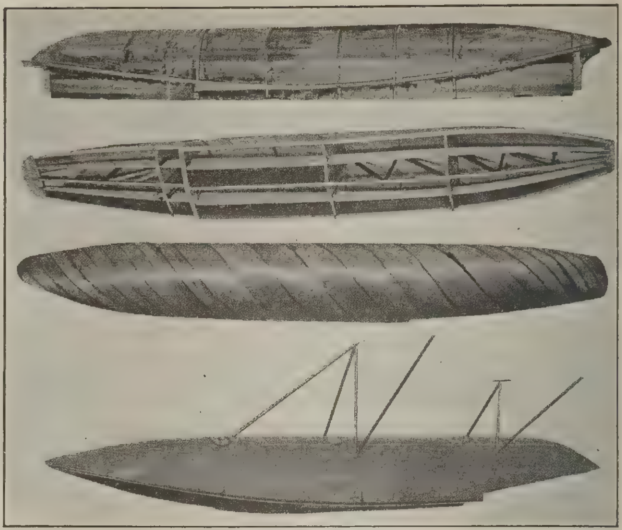
The performance indicated is typical. At first the water resistance rises rapidly, then as the influence of the wing life becomes appreciable and the model begins to plane, the resistance reaches a maximum at about 6 knots for the fixed condition, and 6 knots for the free to trim condition. The resistance than falls away steadily for both conditions, but in the case of the free to trim condition, holds up longer and usually has a secondary hump. As at high speeds the aeroplane is usually controllable, the fixed trim condition is attainable and, therefore, representative. At low speeds, however, the squatting effect may predominate, or may be even purposely produced to advantage, as the maximum resistance for the free to trim condition is practically always less than that for the fixed trim condition.

From a comparison of similar models of 2,000-pound and 6,000-pound floats, Froude's law of comparison appears to apply satisfactorily, and it also appears that dimensions proportioned to the displacement have planing power in proportion to the displacement, assuming the same get-away speeds in both cases and that the loads correspond to speeds.

Many forms and dispositions of floats have been proposed and tried, and for inland waters several successful forms now exist, but for work in the open sea no form is yet known to have all the required qualities.

The first success was attained by Curtiss with floats of an exaggerated blade form, but these were not as satisfactory as the normal rectangular section float, having a skidform profile. This is a simple and successful form for inland work, and it seems to matter little from a resistance point of view what form of bow curve is used. An examination of the curves of Plate C will show the close agreement in performance of bows having widely different forms of curvature. Various other forms of bows were tried—convex, concave, flat sloping bows, corrugated bows—and all show essentially the same characteristics.

The influence of steps has been tried—one, two, and up to six. From a resistance point of view, it appears unnecessary to provide more than two steps for aeroplane conditions. The first break is usually placed nearly under the center of gravity, and the second forms the stern of the float. If both steps are inclined in the same sense a biplane float is formed, but if the after step rises relative to the forward one, it more nearly approaches the monoplane or single-step form, which has desirable qualities. This is the form which has proved so successful in the flying boat and is the form used in model No. 1844, whose resistance curves have already been referred to. Ventilation of the steps facilitates quick planing and is useful, but is not essential if there is ample reserve of power.



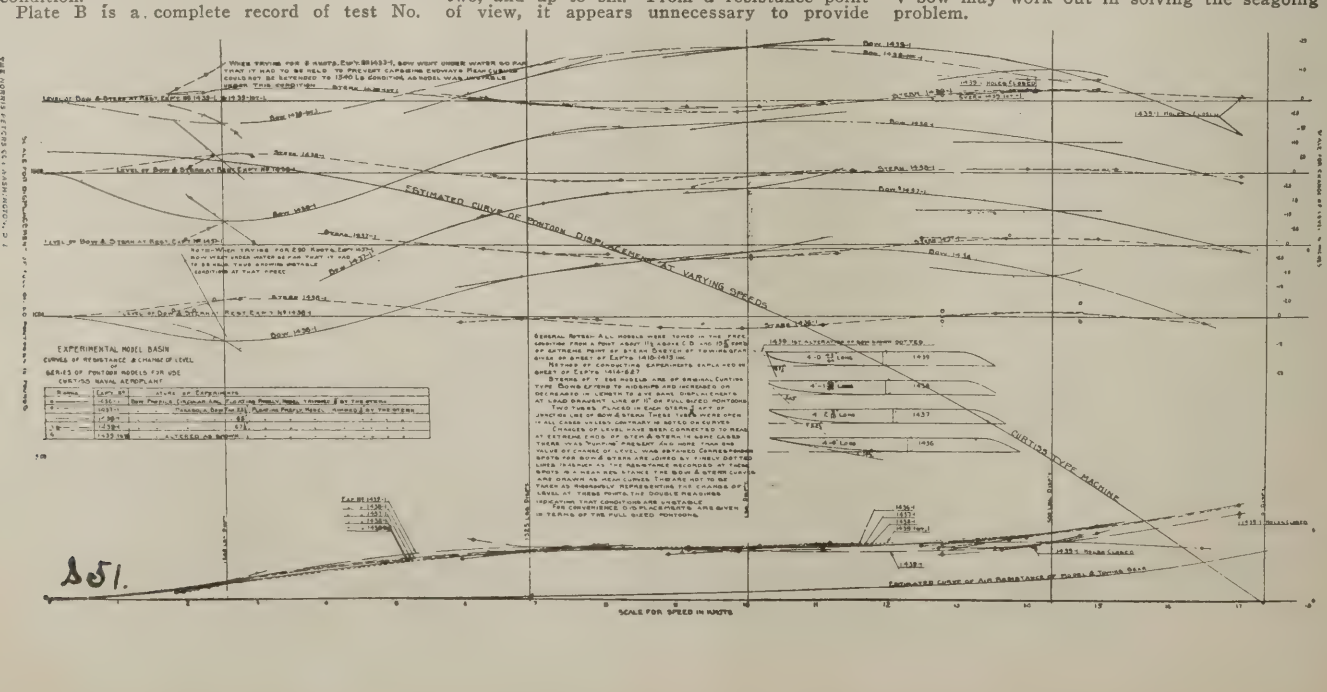
Interference between twin floats at the separation usual in practice appears inappreciable, except at very low speeds.

Flat-bottom floats pound heavily and the flat-bottom-step type porpoises strongly, unless it is handled very nicely even in smooth water.

The introduction of a moderate V-bottom greatly reduces the shock of landing on smooth or rough water. All straight V's throw a strong sheet of spray at the bow. This sheet of spray appears to be independent of the true bow wave. It can be suppressed by the use of hollow V-lines at the bow, but this form is difficult to build strongly and has bad steering tendencies when trimmed by the bow or when making a skidding landing or get-away. A simpler method of suppressing this bow spray is the use of mud guards, so-called for obvious reasons.

The V-bottom also greatly reduces the danger of sticking a wing under on a skidding landing, or when running at high speed across the wind.

The use of fine lines at the bow or stern is not very general, because of the need of longitudinal stiffness. Such lines steer badly, and there is some evidence of the suction effect being present. It is not improbable, however, that a compromise between such lines and the V-bow may work out in solving the seagoing problem.



In construction details in this country the boat-builders' influence is just being asserted. The principal builders have followed a box-like construction not disposing of their material to advantage.

In recent efforts to develop a stream-line form of float, embodying as much as practicable the requirements enumerated, the following features have been developed:

Plate D shows views of these floats in different stages of construction. The general form is as nearly stream line as practicable, having a curved deck comprised of two-ply spruce, applied diagonally, one across the other, with cotton sheeting and marine glue between the plies. This construction eliminates the usual deck joints and provides the arched form with diagonal bracing, continuous from chime to chime.

Through the center of the float a longitudinal truss provides the backbone of the construction. Two-ply bulkheads support the float attachments, and the principal bulkheads are tied to each other and to the step by a two-ply fore-and-aft bulkhead built into the center-line girder. These bulkheads are bound by oak ribs and intermediate ribs of oak support the top shell.

The bilge stringers and the keelson are continuous, the step being formed by tapered liners. The step is of oak, as when grounding, or when planing at high speed, the loads are concentrated at the step. The bottom is two-ply spruce, the inner ply running athwartships and the outer ply running diagonally outboard and aft from the keel to the bilge stringers.

Cotton sheeting and marine glue are used in all two-ply work and the plys are held together by special clinch nails of brass.

The bottom is supported by the keel and bilge stringers and an intermediate longitudinal which are in turn supported by the step and bulkheads. The stem and stern pieces are of spruce, shaped to take the longitudinal members and rabbeted to receive the shell planking. The system of bottom planking and longitudinals eliminates the use of bottom frames and really provides continuous framing in the planking itself, similar to Hands' original V-bottom construction. This type of bottom planking appears resilient and strong.

In assembly all butts are covered with glue. All woodwork is given two coats of shellac as soon as it is in place, and is finally given two coats of varnish to prevent the absorption of moisture.

All boundaries of the bottom are sheathed with brass strips set in marine glue. This affords protection and insures water tightness. The float attachments are locally reinforced and strengthened to transmit the loads to the important members.

The method of construction involves the use of a wooden form shaped to the molded lines and cut into sections to allow of removal.

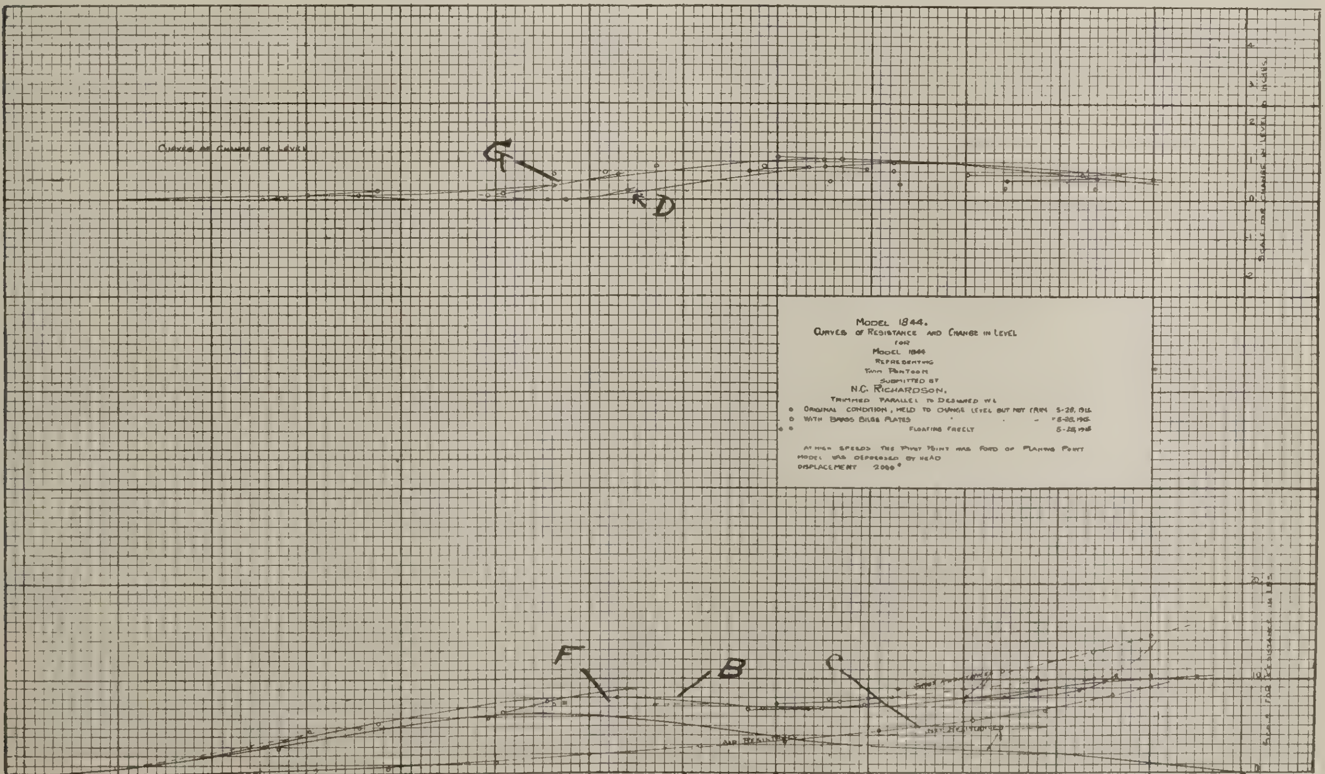
The center-line girder is next assembled with the bow and stern blocks and the step. This is then assembled with the form in which the slots for the ribs and the bilge stringers have already been cut. The frames and stringers are then bent and set and faired flush with the surface of the form. Next the inner ply of planking, which has already been shellacked and varnished on the inner face, is applied and secured to the frames and longitudinals by means of screws. Steaming is unnecessary. In some cases it is necessary to humor the sharp curvatures at the ends by the use of hot water, applied with a swab.

This first ply of planking is then coated with marine glue and the sheeting is applied, followed by the second ply of planking, which is treated with marine glue as fast as each piece is shaped. The second ply is secured in a manner similar to the first ply. The seams of the first ply are traced on to the second ply in pencil, for the purpose of laying out the nails securing the two plys together. Once the second ply is laid, these nails are driven at intervals of about 2 inches along the margins of both plys of planking, the ends of the nails projecting into the wooden form. The form is now removed, the nails are clinched, and additional quilting nails are systematically driven and clinched. In the meantime the bulkheads and bottom planking have been assembled roughly to dimensions on a flat slab. The bulkheads are now neatly fitted and inserted and secured to the frames by screws and glue. Next, the intermediate longitudinals are placed and secured and all special bracing and fittings for the float attachments are placed and the bottom frames of the bulkheads secured. The bottom planking is now carefully fitted and the drain plugs installed in the proper locations. The hand holes and the holes for the ventilating tubes are laid off, cut, and reinforced, and then the bottom planking is applied and secured. The ventilating tubes are next secured. The entire float is now turned over to the painters, who carefully sandpaper the surfaces and apply two coats of shellac and two coats of varnish. After this is done the step casting, edge strips, false keels, mud guards, and deck fittings are applied.

Each of these floats, designed for 1,000 pounds displacement and 60 per cent reserve buoyancy, weighs, complete, 125 pounds. The principal dimensions are: Length, 15 feet; maximum beam, 24 inches; maximum draught, 14 inches.

The floats illustrated have been used in service with very satisfactory results. The aerodynamic properties of these floats are good. They have the least resistance when the deck is inclined at—3 degrees to the wind, and in this position have no lift; consequently, they present a minimum disturbance in the equilibrium of the aeroplane.

It may seem queer that metal floats have not come into general use. There are several reasons for this, however, the principal reason probably being that the form of floats is as yet nowhere near standardized, so that metal construction for special cases would prove excessively costly. But another reason is that when the attempt is made to build floats of the dimensions required on weights which compare favorably with wooden construction, it is found that the metal itself is so thin that it lacks the required stiffness to preserve its form under service conditions; further, that this thickness provides too little margin for the effects of corrosion, particularly in salt water; and, in particular, the bottom itself would require an elaborate system of support in order to prevent it bending badly under the heavy pressures encountered in service. However, as the number of aeroplanes in service becomes greater and the form of floats becomes to a certain extent standardized and larger, it is probable that metal construction can be satisfactorily solved.



FOREIGN NEWS

FRANCE

Mr. H. G. Wells, the well known novelist and essayist of Great Britain, has lately been to the front in France, and tells of very interesting aerial developments on the battle-line. His description of the accuracy with which the French photograph the enemy trenches and fortifications is exceedingly interesting. After speaking of the fighting machines he goes on:

"Close after the fighting machines," he says, "come the photographic aeroplanes, with cameras as long as a man is high, flying low, at 4,000 or 5,000 feet that is, over the enemy trenches.

"The Archibald leaves these latter alone; it cannot fire a shell to explode safely so soon after firing; but they are shot at with rifles and machine guns. They do not mind being shot at; only the petrol tank and the head and thorax of the pilot are to be considered vital. They will come back with forty or fifty bullet holes in the fabric. They will go under the fire along the length of the German positions exposing plate after plate; one machine will get a continuous panorama of many miles and then come back straight to the aerodrome to develop its plates.

"There is no waste of time about the business, the photographs are developed as rapidly as possible; within an hour and a half after the photographs are taken the first prints are going through into the bureau for the examination of the photographs. Both British and French air photographs are thoroughly scrutinized and marked.

"An air photograph to an inexperienced eye is not a very illuminating thing; one makes out roads, blurs of wood and rather vague buildings. But the examiner has an eye that has been in training; he is a picked man; he has at hand yesterday's photographs and last week's photographs. If he is a Frenchman he is only too happy to explain his ideas and methods.

"Here, he will point out, is a little difference between the German trench beyond the wood since yesterday. For a number of reasons he thinks that will be a new machine-gun emplacement; here at the corner of the farm wall they have been making another. This battery here—isn't it plain? Well, it's a dummy. The grass in front of it hasn't scorched, and there's been no serious wear on the road here for a week. Presently the Germans will send one or two wagons up and down that road and instruct them to make figure eights to imitate scorching on the grass in front of the gun.

"We know all about that. The real wear on the road, compare this and this and this, ends here at this spot. It turns off into the road. There's a sort of track in the trees. Now look where the trees are just a little displaced. (This lens is rather better for that.) That's one gun. You see? Here, I will show you another. * * *

"The French claim that they have located new batteries, got their tir de demolition upon them and destroyed them within five hours.

"And, as I say, the German army knows of this, and knows that it cannot prevent it because of its aerial weakness. That knowledge is not the least among the forces that is crumpling up the German resistance upon the Somme.

"I visited some French guns during the tir de demolition phase. I counted nine aeroplanes and twenty-six kite balloons in the air at the same time. There was nothing German visible in the air at all.

"The French have adopted a very ingenious system of finding out fortifications and targets, which to the artillery are invisible, through being masked or hidden very effectively.

"The French aviator ascends, and after circling around at a safe altitude discovers the masked battery or whatever his target may be. Then he commences to fly in circles directly above the target. The artillery officers station two men at different points and have them take angular measurements of the imaginary circle.

"The heavy cannon and mortars are then aimed simply by mathematics, once these different angles have been found."

GERMANY

As the result of air combats on the Western Front during the month of October, says the Overseas News Agency, 102 Anglo-French aeroplanes were lost. Of this total, 58, of which 37 were British and 21 French, fell into German hands. Forty-two were shot down beyond hostile lines. Two were forced to land behind the battlefront.

The German losses in October, says the agency, were fourteen aeroplanes.

GREAT BRITAIN

What amounts to the first authentic information on the latest Zeppelin, has been gathered by Mr. C. G. Grey, the editor of *The Aeroplane,* published in London. Mr. Grey was recently permitted to make an inspection of one of the Zeppelins brought down on the outskirts of London, and his findings are exceedingly interesting. His opinion of the Zeppelin as an engineering job is summed up in the following words: "Right here, let me state," he says, * * * * "If we cannot build something better than a Zeppelin it is time that we retired from business as an engineering nation. After calling the Zeppelin a hollow fraud he states that he cannot give his reason for his belief in its defects as the Hun will profit by adverse criticism.

"Taking it all around, the Zeppelin is moderately well designed as a whole, fearsomely clumsy in its detail design, and abominably made. We have Germany's experience at our disposal and all we have to do is to improve on her product, which is as easy as falling off a log." (*Log falling must be exceedingly difficult to the English.*)

Mr. Grey goes on with a more detailed description.

The length of the latest Zeppelin is about 680 feet and its maximum diameter about 72 feet.

Unlike the older ships, in which there was a V-shaped keel underneath the envelope, the new ships have a flat bottom, constituting one of the 25 sides of the ship. The keel is built up inside the hull, so as to form an inverted V over the flat bottom section. This inverted keel not only strengthens the entire ship, but forms a passage way to facilitate communication between the different cars.

The new Zeppelins have four cars, with six motors and six propellers. Four of the propellers are pushers, and two tractors. The motors are rated at 240 H. P. each.

The forward car, which is the control car, has a single engine driving a pusher propeller. The rearmost car is situated almost 200 feet from the rear end of the ship and contains three engines. One drives a geared-down pusher, while the others drive two propellers placed high up on the sides of the ship.

The actual controlling of the ship is all done from the forward car, and is apparently accomplished by ordinary hand wheels and cables.

All rudders and elevators are balanced to reduce the manual work. As far as could be ascertained there were 9 machine guns carried, and a crew of about twenty-two men.

It is stated that the Aeronautical Society of Great Britain has decided to recognize the Society of British Aircraft Constructors, and that recognition by the Royal Aero Club will follow shortly. There have been two groups in Great Britain which have been fighting for the right of being recognized as the representative body of the Aeronautical Industry. They are the Society of Motor Manufacturers and Traders, and the Society of British Aircraft Constructors. The S. M. M. T. has been holding the Aero Shows as a sort of side issue of the automobile show, but have suffered a slight loss on it. The Society of British Aircraft Constructors could not very well hold a show as the other body had each exhibitor signed not to exhibit in any other show.

It is thought that the Aeronautical Society realized that trouble would eventually come out of this and decided that the time was ripe to recognize either one or the other.

HAWAII

The newly organized Aero Club of Hawaii, of which Brigadier General Robert K. Evans is president, and the one time Queen Liliuokalani, the governor of the territory of Hawaii, and the commandant of the naval station there are members, has applied for affiliation with the Aero Club of America.

ITALY

Mr. H. G. Wells, in his correspondence with the New York *American,* tells about the Italian aeroplanes. By the kindness of the *American* we are able to reproduce part of his article.

"On the western front aviation has been screwed up to a very much higher level than on the Italian line. In Italy it has not become, as it has in France, the decisive factor. The war on the Carso front in Italy—I say nothing of the mountain warfare, which is a thing in itself—is good warfare well waged, but not such an intensity of warfare.

"The Italians, alone of all the western Powers, have adopted a type of aeroplane larger and much more powerful than any except the big Russian machines. They are not at all suitable for any present purpose upon the Italian front, but at a later stage they would be invaluable on the western front, because of their enormous bomb or machine gun carrying capacity.

"The big Caproni machines which the Italians possess are 300-horsepower and will presently be biplanes of 500-horsepower. One gets up a gangway into them as one gets into a yacht. They have a main deck, a forward machine gun deck and an aft machine gun. One may walk about in them when in the air. In addition to guns and men they carry a very considerable weight of bombs. They cannot, of course, get up with the speed nor soar to the height of Britain's smaller aeroplanes; it is as a carrier in raids behind a force of fighting machines that they should find their use."

JAPAN

The following is from the *Tokyo Times* of October 17th, which has just come to hand:

The navy hydroplanes of Oppama had some practice Sunday morning in spite of the rain. Lieutenant Kani took out Hydroplane No. 11, with Lieutenant Sakamoto on board as observation officer, and while flying over the Tokyo bay near Tateyama, a sudden gust of wind overbalanced the machine, which fell into the sea from a height of fifty metres. Lieutenant Kani was slightly wounded in the leg, but Lieutenant Sakamoto escaped unhurt. The machine was also slightly damaged and brought to Nagahama by a boat sent to the rescue.

The military authorities have recently acquired a plot of ground located in Kametsuri Yama, Toyama prefecture, for the practice of shooting at aeroplanes.

According to the authorities, Japanese soldiers are well trained in shooting on the level, but shooting at aeroplanes is an entirely different matter, as those who are not properly trained for the work find it impossible even to judge distance and the effect of the wind. For these reasons the military authorities have decided that a practice field for the work in question should be acquired.

RUSSIA

A report from Russia, as yet unsubstantiated, says that Russian troops near Sarny, southwest of Pinsk, have brought down a large Zeppelin. The crew of sixteen men was captured, besides two machine guns, three other guns and six hundred pounds of bombs.

Only artillery, reconnoitering and airplane operations along the Russian front are reported in the War Office statement of November 26, which reads:

"Near Prudy station, northwest of Molodechno, a German airplane was brought down by our machine gun fire. The occupants, an officer and a private, were made prisoners.

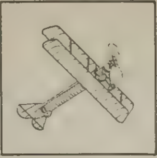
"On the River Stokhod, near the village of Vulka-Porskaia, an enemy airplane was struck by our fire near the village of Pojarki, north of Rovice, and brought down. The wings of the machine were burned. The aviators were made prisoners.

"West of Novo Oleksinietz the enemy is violently bombarding our positions. Enemy airplanes also flew over our positions. One was attacked by our aviator, Captain Vaftalovsky, and, being hit after a fight lasting one minute, landed in the region of Rudaia-Pochaievskia station. The machine, which was undamaged, was found to possess two machine guns. The aviator and the observers were made prisoners.

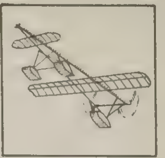
"Southwest of Ezerna-Zolotcheff station in the region of the village of Augustovka, our scouts accomplished several successful reconnaissances, engaging an outpost, bayonetting some and taking others prisoners.

……

"In the region northeast of Kirlibaba (Carpathians) the enemy is violently bombarding our positions with artillery."



MODEL NEWS



Edited by G. A. Cavanagh and Harry Schultz

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MODEL AERO CLUB OF OXFORD
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Through the courtesy of a member of the Aero Club of the Northwest we have received the following essay which was prepared by Master F. Malcolm Crowe, age 12, who is a student in the English class at the Moran School, located near Seattle. We are indeed indebted to Mr. E. N. Gott, secretary of the Aero Club of the Northwest for his courtesy in sending us this excellent composition which so clearly expresses the viewpoint of this youthful writer; in fact, it is safe to say that it expresses the viewpoint of all those who are interested in aeronautics. The essay follows:

"The So-Called 'Dangerous' Aeroplanes"

By F. Malcolm Crowe
Age 12

"My, I wouldn't risk my skin in one of those rickety things!" and a score more of like remarks are hurled almost daily by the average citizen at the supporters of the aviation industry. Yes, I have a right to say "industry," for does not a factory that has an output of over thirty of the latest aeroplanes per week come under this heading, or another that produces twenty in a like period of time? A maker whose products' valuation is safely estimated at $250,000 per week? All this in the average week. What I have named is the amount of business that the Curtiss Aeroplane Company turns out in the already stated length of time. This is only *one* company. For the support of my statement, I will name a few of the leading makers. The Curtiss, the Burgess and the Sturtevant; the Martin, the Thomas and the Wright. These are only a few of the *leading* makers. Are they not more in themselves than the skeleton of an industry?

You say the aeroplane is dangerous. Carefully worked out statistics show that in proportion to the amount of machines owned in the United States and to the number of automobiles, the majority of fatal accidents rests on the latter. This is the absolute truth, backed to the limit by *men who know.* Look, for example, at Glenn H. Curtiss and Orville Wright. They are still alive! You may say, "How does it happen that the famous aviator, Beachy, was killed?" In reply I would ask, "How does it happen that the famous driver, 'Billy' Carlson, was killed?" They were both in the exhibition line. There are as many men, on the percentage basis, that are flying conservatively as there are motor car drivers, but the people hear only of these men when they do something that is "showy," just as the people do not hear of the ordinary type of motor car driver. The aeroplane is as safe as—oh—nuff sed!

Perfectly sane men predict "that in twenty-five years there will be aerial fire and police departments, ambulances, and passenger, freight and mail cars." Let us glance around for indications of the fulfillment of this prediction. Warring nations have in the present war made use of machines for ambulances, as well as their regular duties. As for their worth in warface, let me quote the late Lord Kitchener, who has said, "One aviator and his aeroplane today are worth four thousand soldiers." The United States Mail Department has called for bids for carrying mail by aeroplane; there are numerous passenger-carrying lines, in California especially. Therefore, we have the fire departments and heavy freight carrying yet to be introduced. Indications show that we will not have long to wait, as a flying boat capable of lifting fifteen tons is now building.

When the present war is over, thousands of aviators will come to the United States. These are men who have joined for the duration of the war, men who have experienced the thrill of aviation, and men who will continue to travel through space, to travel where there are no limits as land or sea. Therefore, it becomes apparent that at the end of the great conflict, America's aviation will receive an immense increase in utilitarian usage. We should prepare for this coming, by severing the connection between the words, "aeroplane" and "dangerous."

We all believe in fair play; let us then be unprejudiced in regard to the aeroplane. And when the chance arises, let the aeroplane demonstrate its usefulness to you and to humanity at large. Remember that

AEROPLANES ARE LIFE SAVERS,
NOT
LIFE WASTERS

LIFE HELPERS
NOT
LIFE DESTROYERS

Spokane Model Aero Club

A model aero club is to be organized in Spokane by Mr. Tom Murphy of E1712 Twelfth avenue, who has just received his membership certificate in the Aero Science Club of New York City.

A meeting of those interested will be held Saturday night at Mr. Murphy's home to effect an organization. The standard rules and regulations will be read for the benefit of prospective members.

The new club will be affiliated with the Aero Science Club of New York City. Reguar meetings of the club will be held at which talks and discussions of aeronautics will be the order of business.

Mr. Murphy has been interested in aeroplanes and gliders for some time. Although he s still a junior, he has built several gliders and now has a full-sized model under construction which will be ready late in December. All those interested in aero work are invited to attend the organization meeting of the club.

The Desoutter Power Plant for Models

The following particulars *re* Mr. Desoutter's (English) model and plant will, we feel sure, prove of especial interest to our readers: Weight of engine, including 27 ins. propeller, ¾ lb.; weight of CO_2 cylinder fully charged, 2½ lbs.; weight of regulator, including hot-water cylinder (full), ½ lb. Working at a 4 lb. thrust, the duration is 40 secs., and working at a 3 lbs. thrust the duration is about a minute. This duration could, of course, be extended by carrying more than one cylinder, two such on a well-constructed model could undoubtedly be carried. In the case of a longer duration no doubt some form of automatic regulator would have to be employed—just the same as has been found necessary in the case of a flash boiler steam-driven plant. The Desoutter model was a one-quarter scale two-seater Nieuport. The cylinder was of spun copper and not capable of sustaining a very high pressure. The test applied by Mr. Desoutter was, we believe, the making of a dent in the copper and when the dent flattened out—under pressure—he thought it unwise to try more, a method perhaps not highly scientific, but certainly ingenious. The flight already referred to ended in a collision with railings and was about 90 ft. in length. The type of engine, as can be seen from the illustration, is a single cylinder—double acting. The stroke is 32 mm., the bore 35 mm. The material magnalium and steel. The complete weight of the model in flying condition, 8 lbs.; span, 8 ft. 6 ins.; area of main plane, 10 sq. ft.; area of non-lifting tail, 2½ sq. ft.; diameter of propeller, 27 ins.; pitch of propeller, 22 ins.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Ten Aviators Fly to Yale-Princeton Football Game

(Newspaper Headline)

To the imaginative mind there is enough material in this simple news item for a story that would put H. G. Wells to shame, and cause the Rudyards of England to cease from Kipling. As this poor battered old world struggles through its different stages of demoralization, they will not even let us play our old games anymore. We used to gather in the street, with one eye on the cop on the corner, and play "Shinney." And a grand old game it was to get even with some one you did not like. All we needed was a stick with a curved end, a ball, a rock, or a discarded tomatoe can. The idea was to knock the ball—more often a can—down the street past our adversaries, and if possible through the window of the Chinese laundry on the corner. And if in our frenzied progress down the street, we could raise a few black and blue marks on the shins of that tough Irishman from the gas house district, we were doubly the victor. (Hence the name "Shinney").

But as we grow older, we go off to some institution and get exposed to an education. Do they let us play Shinney any more? They do not! They put skates under our feet, give us ten-pound clubs, throw a miniature rubber cheese box on the ice, and charge the public a dollar or more to watch us get concussion of the brain. (The game now is technically known as "Hockey.")

Then a bunch of millionaires who have forgotten how to walk from the continuous use of the automobile, gather together a small fleet of undersized horses, call them polo ponies, have special mallets made, and invite the four hundred to come out in the air. Mounting their horses, they gallop all over a well groomed field and batter a ball about the size of a quinine pill, until it either breaks under the strain, or passes between two posts known as "goal posts." When the goal is made it is the signal for an outburst of well-modulated applause from the oil-magnates and limousine-lizzards on the side lines.

So it is not a far stretch of the imagination to consider the football game of the future. Aerial football it might be called. Dipping into the future, here is how a newspaper report might sound.

"Before a crowd of one hundred thousand people, stationed in captive balloons, five hundred feet above the earth, Yale and Harvard played their annual aerial football game today. While Yale stuck to the old fashioned style of play, using heavy military tractors in their efforts to score, Harvard employed the latest speed scouts, sacrificing weight and strength for speed, and circled the Yale ends easily.

"From the time when the referee dropped the ball—a small spherical balloon—from the super-super-super Zeppelin overhead, the superiority of Harvard was manifest. Early in the first quarter, one of the Harvard ends secured the ball, and as the Yale backs crashed through, looped the loop and crossed the goal line to the consternation of the Yale team, which insisted that such a thing was not permissible. However, the Harvard aeroplanes while crossing the goal line punctured one of the balloons which held the posts in the air, the posts fell to the earth, and the game had to be postponed."

CURED.

Passenger returning from his first flight.

"Well, I'll never kick about those department store elevators again!"

CHEATED.

Tommie, in the trenches watching the aeroplanes circling overhead, "And ter think that I paid arf a crown ter see *one* of them at Hendon!"

Citizen.—I see that the Army has decided to purchase some aeroplanes.

Government Official.—Is that so? I thought that we had one already!"—*Life.*

The man asked the girl to marry him to see if she was engaged.

She wasn't.—*Nashville Banner.*

The man speeded up to see if he could beat the train to the crossing.

He couldn't.—*Columbia State.*

The man struck a match to see if the gasoline tank was empty.

It wasn't.—*Cincinnati Enquirer.*

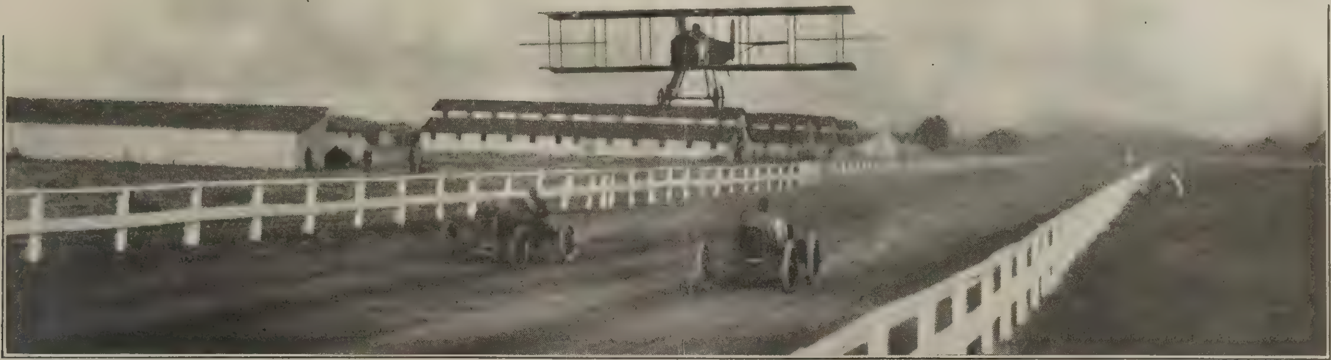
The man blew out the gas to see if the asphyxiation tales were jokes.

They weren't.—*Memphis Commercial Appeal.*

The Aeronitis Editor printed the above little quips to save him the labor of thinking up some of his own.

They did.

Demonstrator of Aeroplane supplied to Government as "Speediest thing in the air."—"Chuck the bloomin' gun over and we'll beat the blighter yet"!



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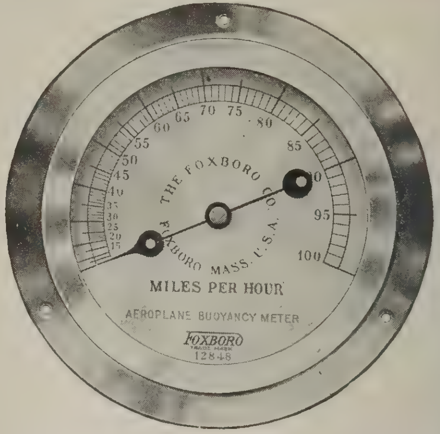

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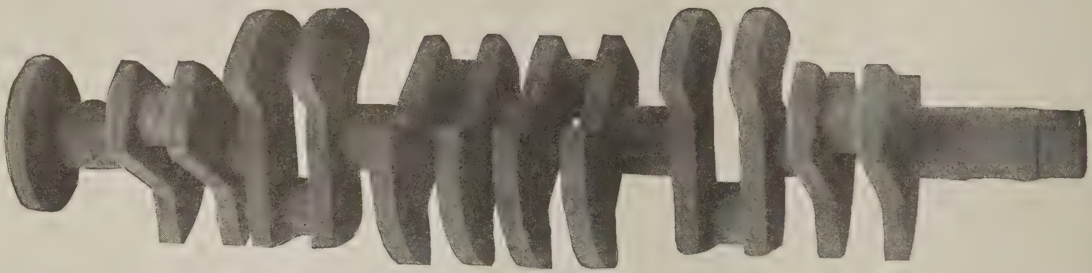

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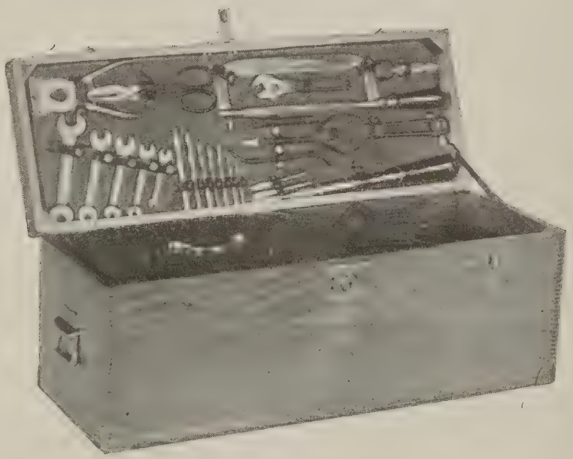

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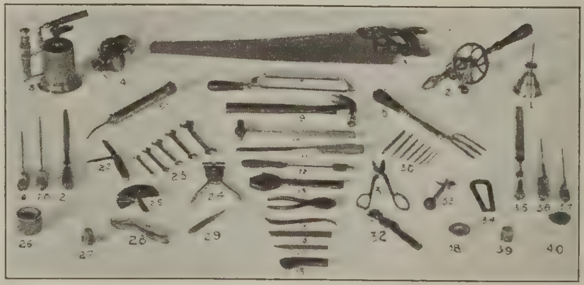

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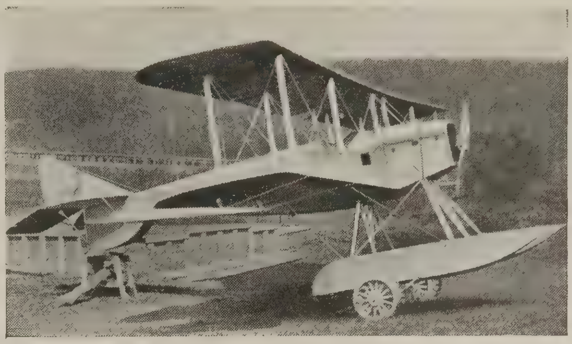

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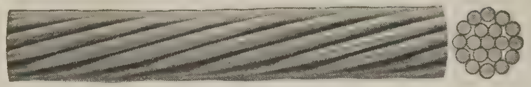

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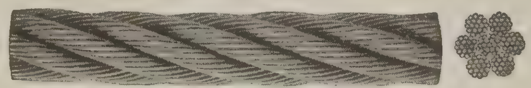

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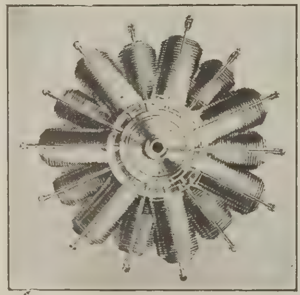

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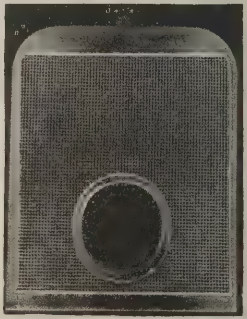

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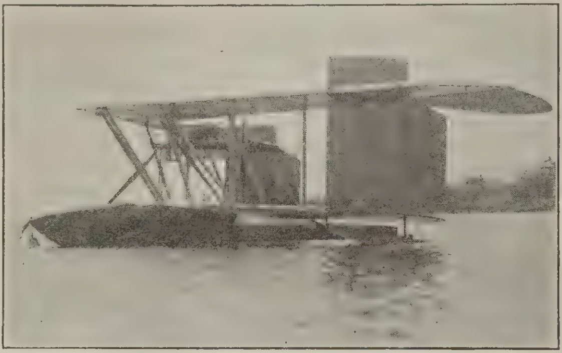

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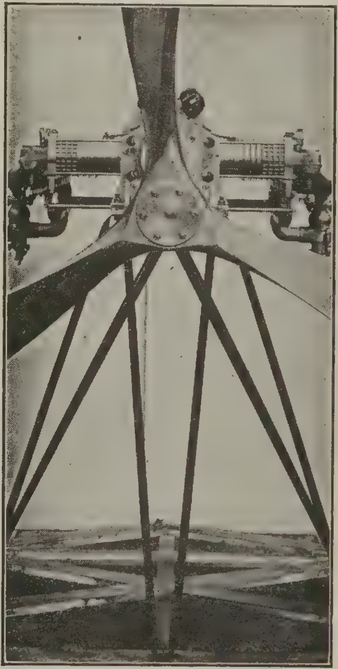

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Duration of Test	1 hr.
Average R. P. M	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
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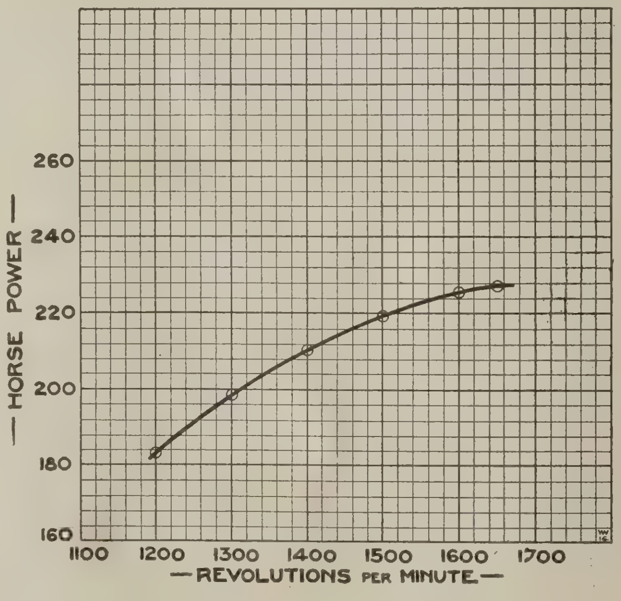

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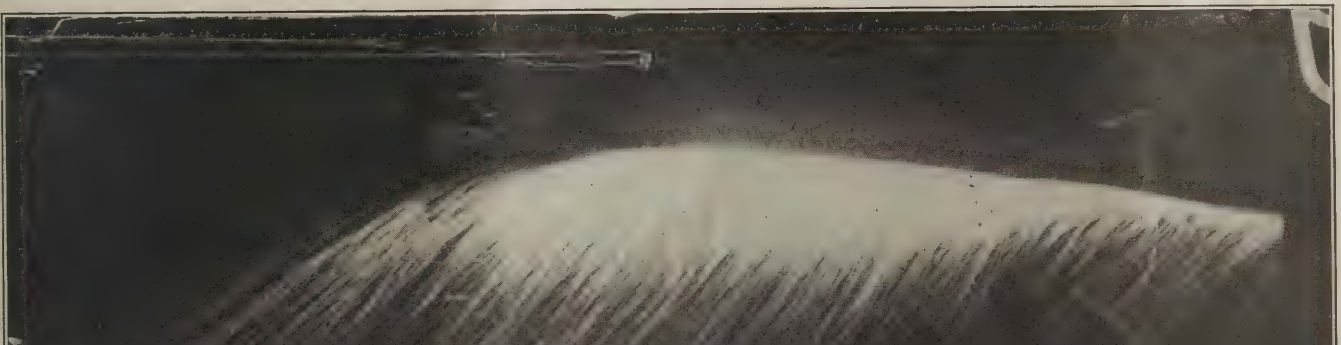

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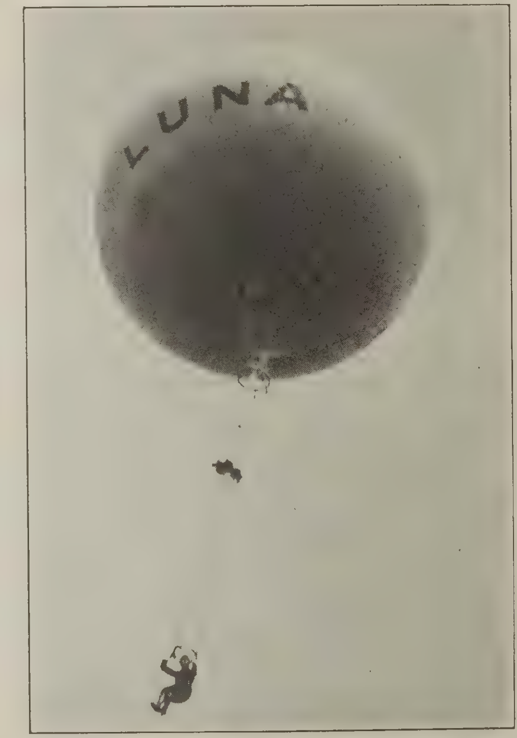

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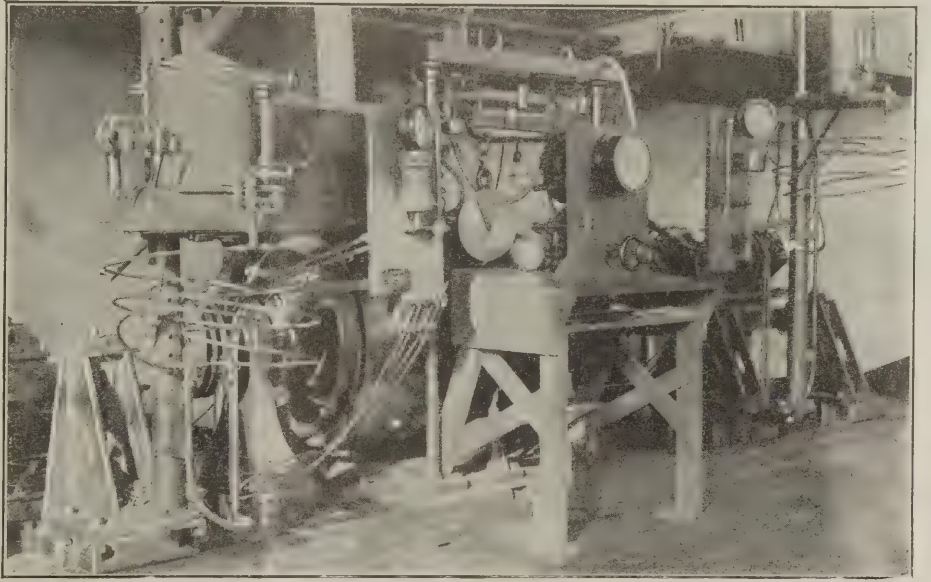
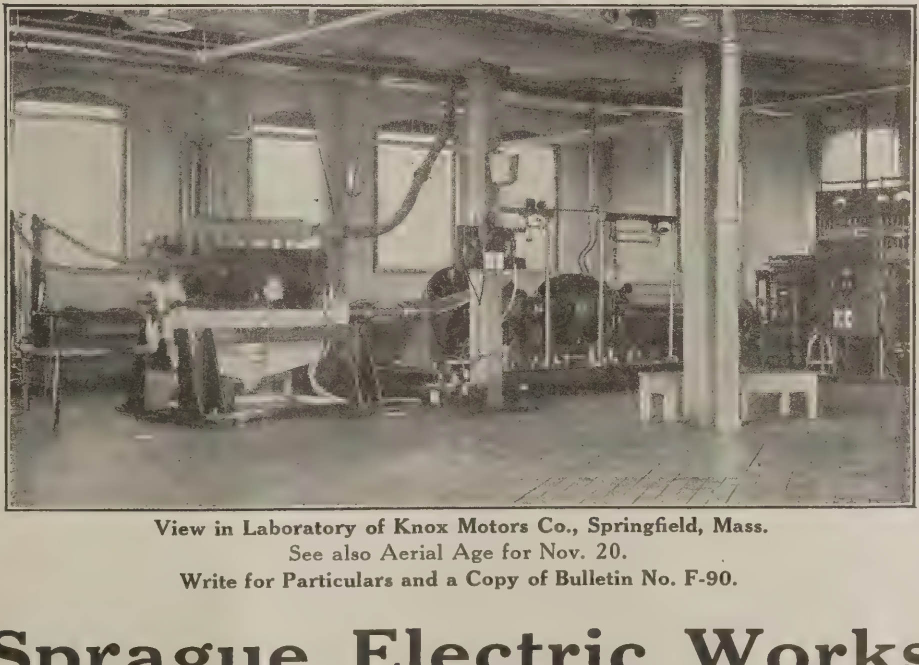


View in Laboratory of Curtiss Aeroplane and Motor Corp., Buffalo, N. Y.
See Aerial Age for July 24.



View in Laboratory of Knox Motors Co., Springfield, Mass.
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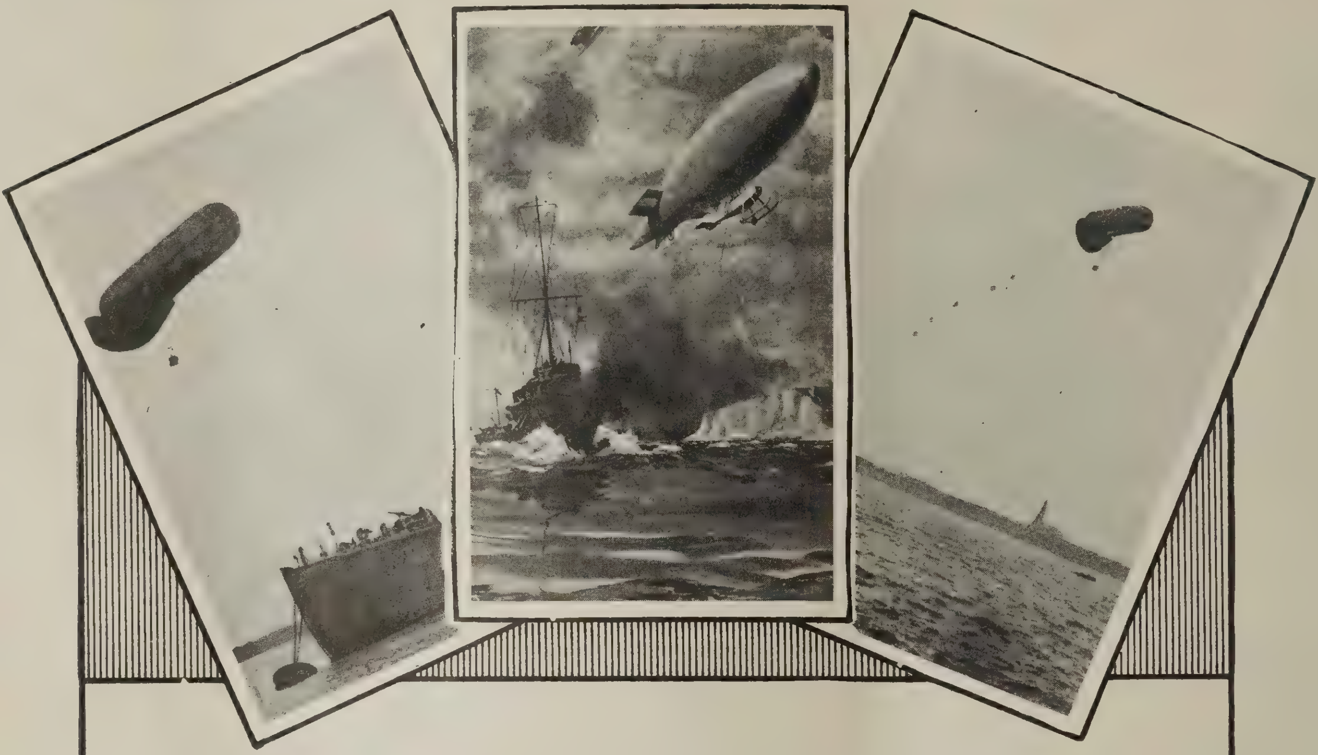

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WEEKLY

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VOL. IV NEW YORK, DECEMBER 11, 1916 No. 13

UNITED STATES HAS THE MACHINERY NEEDED TO MAKE AMERICA FIRST IN AERONAUTICS AND ONLY NEEDS COOPERATION OF EFFORTS

What Different American Institutions Can Contribute to Making America First in Aeronautics

By HENRY WOODHOUSE

MR. ALAN R. HAWLEY, the President of the Aero Club of America, by pointing to the possibility of making America first in the coming two years has rendered another service of national importance. As he states, we have in America today tremendous resources. American aeroplanes and aeronautic motors are as efficient as the best European products; our aviators are as good as any, our people and the press are thoroughly appreciative of the wonder of human flight; our need for aerial defense is as extensive as in any other country; we have more possibilities for the employment of aircraft for transportation than any other country; we have more sea-coast, lakes and rivers where one can use flying boats for sport and passenger carrying than any other single country; there has been more attention given to aeronautics by civilians in this country than in any other country; we have 19,000,000 young men of military age, the majority of whom, if a vote were taken, would be shown to wish to take up aviation. And there is no gainsaying that we have more ingenuity and spirit of enterprise here than anywhere else.

Cooperation, Coordination, Concentration Should Become Motto of Aeronautic Movement

Cooperation between the institutions interested in aeronautics; coordination of their efforts and concentration of efforts towards one end making America first in aeronautics, should become the motto of the aeronautic movement.

Mr. Hawley very aptly points out that our extensive resources are in an incipient stage of development. "We see these evidences of possibilities, but the results are not yet fully accomplished. It will require about two years of continuous close cooperation with general encouragement from those who are in a position to encourage, such as the Government, the press and the aero clubs. We feel that this cooperation will be given. . . .

"It is to be hoped that the Council of National Defense, which was created by Congress, especially for the purpose of developing relations between the government and the patriotic organizations and the industries, and has the power to bring about the coordination of aeronautic resources, will take steps to bring about the coordination of the aeronautic resources. This is undoubtedly American aeronautic's greatest need."

Agreeing heartily with Mr. Hawley's conclusion and considering how this plan can be realized, we find that we practically have all the machinery needed to do it.

The institutions which constitute the machinery needed to realize the plan to make America first in aeronautics are:

(1) *The Council of National Defense,* which, having been created by Congress especially for the purpose of coordinating the national resources and developing relations between the government and the patriotic organizations and the industries, and having in the Council the heads of those government departments which are interested in aeronautics, has the power to officially start the machinery moving to coordinate the efforts of all the other institutions.

To make the Council of National Defense complete there should be a Secretary of Aeronautics, who, as head of the Department of Aeronautics, would supervise the carrying out of decisions of the Council of National Defense. Until a Secretary of Aeronautics is appointed a member of the Advisory Committee of the Council may represent the aeronautics movement in the Council. The Council, as a whole, reports to Congress and recommends what should be done to foster greater development in aeronautics. It also has almost unlimited power to act in anything which aims to develop resources and coordinate efforts for national defense.

(2) *The Army and Navy* having charge of aeronautics in the Army, Navy, Militia and Aerial Reserve Corps, are the agents which directly carry out the policy specified by Congress and the Council of National Defense to develop military aeronautics. Having large appropriations and having adopted a progressive policy, the Army and Navy are in a position to bring about extensive developments, technical and otherwise, and to utilize the resources in personnel and material created by the other institutions.

(3) *The Post Office, Coast Guard and Forestry Departments* represent the three governmental departments which will use aeroplanes for utilitarian purposes in the near future. In fact, as Lieut.-Col. George O. Squier pointed out, recently, the post-office may before long employ more aeroplanes than the Army and Navy together. The Post Office is ready to start about 200 aeroplane mail-carrying lines and will take the first steps in this direction as soon as arrangement can be made with aeronautic concerns to establish the aeroplane lines. The last Congress authorized the Coast Guard to have ten aviation stations, and that department has the plans ready so that as soon as Congress allows the appropriations needed to establish the stations the plan will be carried out and aeroplanes will soon be employed in conection with the revenue cutter service and life-saving service.

(4) *The National Advisory Committee on Aeronautics* which is composed of representatives of the Army, Navy, Coast Guard, Post Office, Bureau of Standards, Weather Bureau, and the Smithsonian Institution, and includes civilian scientists and engineers, has the authority, the facilities and the means to bring about standardization in the construction of aeroplanes and improvements in aeroplane designs and construction. It is the connecting link between the aeronautic industry, aeronautic organizations and the different government departments, and provides splendid opportunities for the coordination of scientific research and engineering work in aeronautics and encouraging of inventors.

(5) *The Society of Automotive Engineers* (which succeeds the S. A. E. and the American Society of Aeronautic Engineers) represents the aeronautic industry, includes the manufacturers, engineers and inventors, cooperates with the National Advisory Committee on Aeronautics and works out the general problem of standardization and of bringing about closer cooperation between manufacturers and engineers and better understanding between the manufacturers and engineers

and the government through the National Advisory Committee on Aeronautics.

(6) *The Aero Club of America,* representing thirty constituent clubs, is the national aeronautic body which represents the general public in aeronautics and the aeronautic movement to the general public and through its affiliation with the International Aeronautic Federation and the Pan-American Aeronautic Federation, which comprise the aero clubs of 38 countries, controls aeronautic sports and represents the American aeronautic movement abroad and gets for the American aeronautic movement the benefit of the experience of other countries. The Aero Club of America's mission is to arouse public interest in the different branches of aeronautics, and to acquaint the public of aeronautic developments and national needs; support the Army and Navy in their work of upbuilding our aerial defenses, develop aerial sport, foster aerial touring and aerial transportation, establish landing places, provide aeronautic maps, secure practical and uniform legislation to govern aerial navigation and federal licensing of aviators, encourage scientific research and application of aircraft for utilitarian purposes, assist the growth of the aeronautic industry, to enlarge the sources of supply of aircraft and aeronautic equipment for national defense, etc. In other words, the Club's mission is to do whatever there is to be done to develop aeronautics when there is no one else to do it, and act as an aeronautic clearing-house, referring to the other institutions above mentioned whatever comes within their spheres, helping them in every way possible to meet their needs and solve their problems. Here is an instance of how this can be done, and is being done: As the need for suitable men to learn aviation for national defense as well as to develop aeronautics in a general way arose, the Club offered and is offering three medals of merit to each of one hundred leading universities, to be awarded to the three students writing the best essays on military aeronautics; mechanics of the aeroplane, and technical developments of aeronautics; possible application of aircraft for utilitarian purposes. The hundred universities and colleges selected have about 500,000 students, out of which about 5,000 may compete for the medals of merit and not less than 500 should want to become connected with the aeronautic movement and will find their way in the different branches of the aeronautic movement. Another instance, we need a chain of landing places across the continent to afford facilities for air travelers; we also need to train auxiliary and civilian aviators in cross-country flying, demonstrate the possibility of carrying mail by aeroplane over long distances and to test our aeroplanes and motors in long distance flights and demonstrate the progress that has been made in the construction of aeroplanes and motors. To solve these problems simultaneously, the Club has set aside $20,000 for a prize for a transcontinental aeroplane contest, to be held next year. Again, realizing the need of bringing the best American aeroplanes, motors and aeronautic equipment under one roof for the public, military and civil authorities, engineers and manufacturers to see and get a better idea of the status of American aeronautics, as well as to foster the development of Pan-American aeronautics and bring the aeronautic authorities together at a conference, the Club arranged for holding the Pan-American Aeronautic Show, which will be held at the Grand Central Palace, New York, February 8th to 15th. We have, therefore, the resources and the machinery needed to carry out the plan to make America first in aeronautics. We need but closer coperation between the above mentioned institutions, coordination of resources and concentration of action.

What Different Institutions Can Contribute to Making America First in Aeronautics

Next to finding that we have in this country the extensive resources needed to make America first in aeronautics. the most gratifying thing is to find that we have the machinery necessary to realize this plan.

In a general way the art of aeronautics will develop in three distinct, though interrelated branches; military, utilitarian and sport and pleasure. These branches are closely interrelated. The millions of dollars paid in prizes for aviation sporting events in 1908-1912 developed the aeroplane and brought out its possibilities for military purposes. It was the demands of the aero clubs of a dozen countries for speedier aeroplanes for the International Aviation Trophy Competition that made the speed of aeroplanes jump from 40 miles an hour in 1909 to 65 miles an hour in 1910, to 70 miles an hour in 1911, to 109 miles in 1912, and to 130 miles in 1913. I remember the commotion created in American aeronautic circles early in 1912, when the Aero Club of America invited bids for three aeroplanes to make not less than 100 miles an hour, capable of flying at that speed for over one hour. The Club officials knew that the French aeroplanes being built for the International Contest had made close to one hundred miles an hour during the tests and that smaller wings were being made to increase the speed. But the possible employment of aeroplanes for different military purposes was still undefined and the general opinion was that aeroplanes would only be of use for scouting and that for that purpose slow aeroplanes were best. There were only about half a dozen authorities in the world who dared to state that aeroplanes would be used for raids, air fighting and other military purposes and that speed would be a valuable factor for the one reason that speed is a valuable factor in naval aircraft.

It was also the demand for aeroplanes to be employed for utilitarian purposes, as in the case of Rodman Wanamaker's large flying boat, "America," for crossing the Atlantic, and the flying boats for Harold F. McCormick, Robert J. Collier, Harry Payne Whitney, and other leading sportsmen that caused the developing of large aeroplanes for passenger carrying and scientific instruments for navigating the air. In turn, it was the insistence of the military authorities for a larger factor of safety in every part of an aeroplane that is primarily responsible for developing greater safety; and the hundreds of millions of dollars already spent and being spent for military aeroplanes and the large demand for faster and larger aeroplanes are responsible for advancing aeronautics as it might not have been advanced in ten years, and are developing safe and useful aeroplanes for use for utilitarian purposes and for sport. The same is also true regarding trained aviators and aeronautic engineers. The veteran military aviators and workers for military aeronautics were those pioneers, military and civilian, who took up ballooning for sport in 1900-1910 and aviation for sport in 1908-1914. We may expect that the aviators and aeronautic engineers who are now developing air fleets of the world will turn to developing aircraft for utilitarian purposes as soon as the war ends. How soon that will be no one can tell; also, no one can anticipate the complications that may arise any day. Therefore, in considering what should be done to make America first in aeronautics we must give special consideration to speed in developing our aeronautic resources and coordinating them under a central control, if possible, so that they may be easily mobilized for national defense in case of an emergency.

Likewise, at the present time and until the present war is over, greatest consideration must be given to the developing of the military side of aeronautics. While it is true that if we had 3,000 aeroplanes in use for mail-carrying, coast-guard and other utilitarian purposes this country would be in the position of the porcupine which goes about its daily peaceful pursuits, harms no one, but is ever ready to defend itself, it is essential that the aviators who are employed in peaceful pursuits be trained in the art of war, so that they may be efficient for national defense in case of an emergency. Foreign nations have aviators so skilled in aerial warfare that not less than a dozen of them have a record of having brought down between twenty and forty enemy aeroplanes each. Each of these expert aviators would therefore be a match to six of our aviators who are inexperienced in aerial warfare. It is well to point out here that the world at large in the past few years has turned to consolidation of interests, coordination of efforts and mobilization of resources. This has been true everywhere. The present war is being fought by groups of nations working under a centralized power, their efforts coordinated and their resources mobilized. The world is supplied with the things it needs, whether food or munitions, by groups of producers who cooperate more and more closely to eliminate waste and increase production. Looking ahead, we can well anticipate that, whether the present struggle continues or not, the great nations fifty or one hundred years hence, will be the nations which have best understood the economic value of unity of efforts and have best mobilized their resources for national defense, as well as for competition for the world's commerce.

The idea of national cooperation and coordination of resources had only been recently adopted in the United States. As a delegate to the Conference Committee on National Preparedness, the writer well remembers that memorable meeting in May, 1915, when the delegates of a dozen patriotic organizations resolved to advocate the Council of National Defense. They had taken stock of our national defenses and had found a most amazing situation, which still exists to a great extent. This wonderful nation of ours had and has a population of 105,000,000, not less than 19,000,000 of which are men of military age; a national wealth amounting to $200,000,000,000; and industrial resources such as no other nation in the world has.

But at that time our hundred million people were apparently not interested in national defense; only a very small fraction of the men of military age had had any military training; and our tremendous industries, owing to our Government's neglect, were in no way coordinated or prepared to assist the Government in an emergency.

The conclusions are obvious. Lack of interest in national welfare on the part of the general public "chinafied" this great nation and made it appear helpless before the world—keeping it from the rank among nations which is due to it; the nineteen million men of military age, being untrained, and there being no arms or provisions available for them, would be helpless if it became necessary for them to face half a million trained soldiers; our industries, unrelated to the central government and ignorant of the government's needs, would be important in the face of imminent danger.

Therefore, the people and the tremendous wealth of this great nation were, and still are, utterly unprotected.

There is nothing in the way of closer relation and cooperation between these institutions. The friction created by misunderstandings and general anxiety to obtain results at the time when the aeronautic movement tried to do in a few months what should have been done in the past five years was temporary. When we consider that in Europe, especially in England, the problems of developing greater air fleets are responsible for the removal and resignation of many high government officials, and that the question of solving the problems of quickly extending the air service and creating more extensive sources of supply of aircraft are discussed in Parliament and press daily, we realize that we should be thankful that we did not have more trouble. The members of the aeronautic movement are all too broad-minded not to realize that friction created by anxiety to obtain results must disappear when the results are obtained.

The Pan-American Aeronautic Exposition and the Transcontinental Aeroplane Contest afford good opportunities for bringing about closer cooperation, coordination of resources and concentration of efforts between the above mentioned institutions. The Council of National Defense, which meets in Washington on December 6th, can do nothing better than to further this plan and give the different government departments the authority needed to participate in these two important events—and to arrange in other ways to bring these institutions to work together on a cooperative basis.

STANDARD AERO CORP. PRESENTS AEROPLANE TO CAPT. AMUNDSEN

CAPTAIN ROALD AMUNDSEN, the Norwegian explorer, who is preparing an expedition to the North Pole, was in conference with the aeronautic authorities at the Aero Club of America over his plan to use aeroplanes as part of his expedition, and at the luncheon given to Captain Amundsen at the Club House, 297 Madison Avenue. Mr. Harry Bowers Mingle, the President of the Standard Aero Corporation, which has its office in the Woolworth Building, offered to build and present to Captain Amundsen a special aeroplane for his expedition. At the conference, Captain Amundsen stated that his present plans did not include an extensive use of aeroplanes, because the purpose of his expedition is greatly to make ocean soundings, and that can best be done by drifting with the ice. For that reason, he said he would have to drift many months to cover the distance which he could otherwise cover in half a day with the large and fast aeroplanes equipped with many motors which the Aero Club of America authorities proposed to him.

Captain Amundsen's present plans are to use the aeroplanes only for the last hundred miles of the trip. Therefore, part of the conference was a discussion of the equipment to be selected for that purpose, and just then came the offer of Mr. Mingle, the President of the Standard Aero Corporation to build a special aeroplane for the purpose for Captain Amundsen. The Standard Aero Corporation is now building eighteen aeroplanes for the Army and the Navy.

The navigating instruments to be carried on the aeroplanes to make the flight entirely scientific were a matter of discussion at the conference. Captain Amundsen was especially interested in the Sperry automatic pilot and the combined aeroplane compass and drift finder. He and the Aero Club officials will visit the Sperry Gyroscope Company and see these and the other remarkable instruments for aerial navigation recently developed by Mr. Elmer A. Sperry and his sons.

Among those present at the luncheon given to Captain Amundsen at the Aero Club were Alan R. Hawley, President; Charles Jerome Edwards, Henry Woodhouse and Henry A. Wise Wood, members of the Board of Governors; Robert Erskine Ely, Augustus Post, G. Douglas Wardop, Ezra H. Fitch, Walter H. Phipps, Chance M. Vought, Harold D. Kantner, George H. Gay, Guy A. Haustetter, J. G. Gilpatric and Henry W. Shoemaker.

Samuel H. Valentine Leaves $10,000 for Prizes for New Fuel

By the will of the late Samuel H. Valentine, formerly Governor of the Aero Club of America, which was filed in New York on November 28, the sum of $10,000 has been given to the Aero Club to establish a prize, or prizes, at the discretion of the Aero Club, for the encouragement of "aircraft which shall not use gasoline as a fuel." Conditions of the awarding of the prizes under the terms of the will are left wholly to the Aero Club.

Mr. Valentine's bequest is expected to stimulate interest in the discovery of a new fuel, lighter than gasoline, which will make longer flights possible.

His interest in the problem of getting a new fuel was aroused by an editorial written by Henry A. Wise Wood for *Flying*, and by discussion of the subject with Henry Woodhouse.

The Club at the annual meeting passed the following resolution

WHEREAS, In the death of Samuel H. Valentine, which occurred at Narragansett Pier on September 16, 1916, there has been removed from membership one of our oldest members and most earnest supporters; and

WHEREAS, It is a matter of record that Mr. Valentine was one of the five men who first conceived the plan of organizing the Aero Club of America, and that the Club was incorporated, its charter granted and its work initiated as a result thereof; *Be It Therefore Resolved,* That in expressing our deep sorrow because of his demise, we also emphasize our high appreciation of those qualities of heart and mind, which prompted him to give so generously of his time, influence and effort in the upbuilding of our Club, and maintaining its purpose, which will remain as a monument to his memory. The high character of such ideals we shall always endeavor to maintain. *Be It Further Resolved,* That a copy of these resolutions be properly engrossed and forwarded to his widow, in evidence of our grief, and that his service as a founder and officer of the Club be made a matter of perpetual record in the Minutes of the Seventh Annual Meeting of the Club, in testimony of our appreciation.

It may now be said of the members of the Aero Club of America that they do not cease being of value to the development of aeronautics even after their death!

Aero Club Widens Plan to Interest College Students in Aeronautics

TO assist the Aviation Section of the United States in getting college men interested in the Aerial Reserve Corps and military aeronautics, and having received enthusiastic responses from the fifty universities to which the Club presented medals of merit to be awarded to students writing the best essays on aeronautics, the Aero Club of America has decided to extend the offer to all the universities, colleges and miltary schools to which the United States Army has detailed an officer to teach military science and tactics. Those to whom the offer of medals is being made are: University of Arizona, Ouachita College, University of Arkansas, Throop College of Technology, State Agricultural College of Colorado, Connecticut Agricultural, Delaware College, University of Florida, Georgia Military College, North Georgia Agricultural College, University of Georgia, University of Idaho, Concordia College, University of Notre Dame, University of Kentucky, Louisiana State University and Agricultural and Mechanical College, University of Maine, Johns Hopkins University, Massachusetts Agricultural College, Michigan Agricultural College, College of St. Thomas, Mississippi Agricultural and Mechanical College, Montana College of Agriculture and Mechanical Arts, University of Nevada, New Hampshire College of Agriculture and the Mechanic Arts, Rutgers Scientific School, New Mexico College of Agriculture and Mechanic Arts, North Carolina College of Agriculture and Mechanic Arts, North Dakota Agricultural College, Northern University, Wilberforce University, Oregon Agriculture College, Pennsylvania Military College, University of Porto Rico, Rhode Island State College, Clemson Agricultural College, The Citadel, South Dakota State College of Agricultural and Mechanic Arts, Agricultural and Mechan-

(*Continued on page* 345)

THE NEWS OF THE WEEK

$15,600,000 Asked for Army Aeronautics

The sum of $16,000,000 is asked for the Signal Service of the army, of which $15,600,000 is to be used for the aeronautic branch of the Signal Service, out of which latter sum $3,000,000 is to be spent on the establishment of aviation schools. The appropriation of $15,600,000 for army aeronautics is proposed to be spent as follows:

Lighter-than-air equipment	$1,000,000
Aeroplanes and hydro-aeroplanes	6,200,000
Spare parts and accessories	1,625,000
Extra engines and spare parts	2,500,000
Hangars, buildings, and sites	1,200,000
Motor vehicles	480,000
Maintenance and operation of schoools and squadrons	1,700,000
Development and experimental work	470,000

As shown by the estimates submitted to Congress last year, the sum needed for areonuatics for our land defenses is $29,000,000. The estimates submitted by the War Department, given above, are, therefore, very conservative.

The Navy DN-1 Sent to Pensacola

The first dirigible balloon for the use of the United States navy has just been completed by the Connecticut Aircraft Company, of New Haven, Conn., and now is on its way to Pensacola, Fla., for tests preliminary to its official acceptance. The dirigible has been named the DN-1. It is the first dirigible to be built in the United States that has passed the preliminary power tests required by the Navy Department. Charles F. Smyth, general manager of the Connecticut Aircraft Company, said that he expects the dirigible will meet the requirements of the government in its flying tests at Pensacola and that its official acceptance is but a matter of days.

The DN-1 is 175 feet over all and 50 feet high over all, with a beam of 35 feet. It has a total lift, less the space used by the balloonets, of approximately 7,000 pounds, based on the lift of its hydrogen gas at .068 pounds for each cubic foot. It is of the non-rigid type. Its gas bag holds its shape by the pressure of contained gas. The gondola is carried by a suspension attached to the bag. It has a capacity of 115,000 cubic feet of hydrogen gas and is equipped with two balloonets, one in the rear with a volume of 8,000 cubic feet and one in the front with a volume of 7,000 cubic feet. The purpose of these balloonets is to navigate the dirigible and to assist in maintaining its shape against the changes in temperature encountered at different altitudes.

Capt. McKean Before House Naval Committee

Captain Tonah McKean, aid for material to the chief of operations, appeared before the House Naval Committee on December 1st and among other things said the navy had purchased 125 air craft since the air service was established, in 1911. There now are nineteen aeroplanes and three kite balloons in actual service, he said, while a non-rigid dirigible and seventy-seven aeroplanes have been ordered.

Captain Amundsen Visits Sperry Plant

Captain Roald Amundsen, the Norwegian explorer, who is in the United States to select aeroplanes and instruments for navigating the air to use in his polar expedition, accompanied by officers and members of the Aero Club of America, visited the Sperry Gyroscopic Company's works at the Brooklyn Bridge Plaza, on December 10, where they were given a demonstration of some of the newest instruments for aerial navigation as well as gyroscopic ship stabilizers which not only stabilize ships, but will roll a ship and prevent its becoming ice bound.

Captain Amundsen was especially interested in the Sperry drift finder which makes it possible for an aviator to detect the drift of his aeroplane due to winds and check it automatically. Captain Amundsen did not know that there was such an instrument in existence, and whereas the drift finder will be of great value for flights in the arctic, he expresses great satisfaction over it and highly complimented Mr. Elmer A. Sperry and his sons for this development.

Another device of great value for polar exploration, which is yet unknown to the public, is the gyroscopic stabilizer which will keep the ship from rolling in the roughest seas and, when reversed, will make the ship roll six or seven degrees and make it possible to crush the ice which would otherwise prevent its progress. The ship stabilizer was demonstrated on a model ship equipped with the stabilizer, after which they were taken to the factory where they saw a number of these stabilizers being finished to be equipped on ships, including one for Mr. Harry Payne Whitney's yacht. Mr. Sperry told Captain Amundsen that one of these gyroscopic stabilizers has been put in the battleship Ohio, which it at Philadelphia, where the tests are now being made. Those present at the tests include: Captain Roald Amundsen, Alan R. Hawley, President of the Aero Club of America; Evart Jansen Wendell, Henry Woodhouse, William Hawley, Augustus Post, T. D. Merrill, G. Douglas Wardrop, Ezra H. Fitch, and the following aviators: John Lansing Callan, Backwith Havens, who have just returned from Europe; John Guy Gilpatrick, and W. Leonard Benney. Also Chance M. Vought, Walter H. Phipps, F. Erickson, Spencer Heath, Baron d'Orcy.

U. S. Army Men Fly 120 Miles in 90 Minutes

Lieuts. Art Franks and Otis Harley, U. S. A., aviation corps, completed a fast flight from North Island to the Dominguez field, December 3.

Flying two military tractors the aviators made a detour inland and completed the flight of 120 miles in ninety minutes.

Army and Navy Orders

Lieutenants Martin F. Scanlon and Richard B. Barnitze, attached to the Army Aviation School, at San Diego, have been ordered to join the Second Aero Squadron at Manilla. They will sail from San Francisco, December 5. Vice Ensign R. G. Pennoyer, to naval aeronautical station, Pensacola, December 11; First Lieutenant Clyde V. Simpson, 12th Cav., to Fort Sam Houston for examination for detail in aviation section, Signal Corps.

Farr with Hess Steel Corporation

Arthur V. Farr, who for the last three years has been advertising manager of the S K F Ball Bearing Company, Hartford, Conn., has accepted the position of sales manager of the Hess Steel Corporation of Baltimore, Md.

Miss Ruth Law Presented to the President, Mrs. Wilson and Diplomats

Miss Ruth Law, the aviatrice who holds the American cross country nonstop record, was presented and introduced to President Wilson, Mrs. Wilson, the diplomats and members of the cabinet by Messrs. Alan R. Hawley, the president, and Henry Woodhouse, member of the Board of Governors of the Aero Club of America, during the dinner given at the Waldorf on December 2.

It was after her wonderful flight which preceded the illumination of the Statue of Liberty, and she was among the 1,200 guests who attended the dinner, in company of Major and Mrs. Carl F. Hartmann, at whose house, on Governors' Island, she had been to dress for the flight and undress after it. Messrs. Hawley and Woodhouse escorted her to the dais where the President, the diplomats and members of the cabinet sat.

At the guest table the order of the seating was Gutzon Borglum, Harold W. Buck, Joseph P. Tumulty, secretary to the President; Carl Vrooman, Mark M. Fagan, Mayor of Jersey City; Henry Morgenthau, George McAneny, Josephus Daniels, Secretary of the Navy; Vance C. McCormick, Mrs. John Purroy Mitchel, Ambassador James W. Gerard, Mrs. William C. Redfield, Ralph Pulitzer, Mme. Jusserand, President Wilson, Mayor Mitchel, Ambassador Jules J. Jusserand, Mrs. Woodrow Wilson, Chauncey M. Depew, Mrs. Josephus Daniels, William C. Redfield, Secretary of Commerce; Mrs. James W. Gerard, George B. Cortelyou, Charles M. Lincoln, Rear Admiral H. O. Dunn, Henry L. Doherty, Consul General Gaston Liebert, Pierre P. Gorven, Mayor of Bayonne; Dr. Cary T. Grayson, Colonel John Willis and District Attorney Swann.

When Miss Law and her escort stepped on the platform there were prolonged ovations. The President rose and greeted them. "I am very glad to meet you," he said to Miss Law. "You are a brave girl." He also complimented Mr. Hawley who, it will be remembered, was the honorary courier last May and flew with Victor Carlstrom to Washington and took a letter and copies of a special edition of the *World* to the President.

Mrs. Wilson and every one else at the presidential table greeted and complimented Miss Law in turn and exchanged compliments with her escort, who were personally known by most of them. Throughout the evening people came to the table and to the box to greet Miss Law.

Aerial Fleet Urged to Aid Shipwrecked

The employment of aeroplanes as a new means for saving life in the case of vessels wrecked off the coast is urged in the annual report of the United States Coast Guard issued on November 29.

Congress is to be urged at the coming session to grant authority to the life saving service to establish aviation stations and organize a force of trained aviators to be stationed along the coast prepared to supplement efforts of the life savers and their line throwing guns to bring the shipwrecked ashore. Provision for such a force has already been incorporated in the pending naval appropriation bill.

A step has already been taken in the organization of a force of flying life savers. Three junior officers of the life saving service are now undergoing training at an aviation school with this in view.

Members of the National Advisory Committee and others who visited Detroit recently. From left to right the men are as follows: W. H. H. Hutton, Henry B. Joy, Charles B. King; Dr. H. C. Dickinson, Bureau of Standards, Washington, D. C.; Lieut. Col. George O. Squier, Officer in Charge of Aviation; Eugene Lewis, Dr. W. Stratton, Director of Bureau of Standards; Henry Souther, Consulting Engineer United States Army; Dr. Charles F. Marvin, Chief of Weather Bureau, Washington, D. C.; Howard E. Coffin, S. D. Waldon; Lieut. W. G. Child, United States Navy; Roy D. Chapin; Dr. Charles D. Walcott, Sec. Smithsonian Institute; Russell Huff.

Aero Club of New England Elects Cabot as President

The Aero Club of New England, at its annual meeting voted to ask the Legislature to purchase a suitable aviation field where would-be aviators may be trained for service with the Massachusetts militia. The vote was incorporated in the form of a resolution, which will be presented at the next session of the General Court.

The state field at Framingham, where flights were made last spring, or a tract of 600 acres at Saugus are the sites proposed in the resolution. The resolution also asks an increase in the state appropriation for the building and upkeep of aeroplanes, and an effort to obtain for Massachusetts a share of $13,000,000 set aside by the federal government for aviation.

The club sent a telegram of congratulation to Miss Ruth B. Law, who established a new American non-stop record when she flew from Chicago to Hornell, N. Y., a distance of 600 miles. Miss Law, a Lynn girl, made her first flight in 1912, at a meet held under the auspices of the club. Last night's meeting was followed by a dinner, which celebrated the 133rd. anniversary of man's first flight into the air.

Officers were elected as follows: President, Godfrey L. Cabot; vice-presidents, J. Walter Flagg, Worcester, and J. S. Hathaway; secretary, William Carroll Hill; treasurer, Alfred R. Shrigley; directors, Nathan L. Amster, Clarence W. Barron, Godfrey L. Cabot, J. Walter Flagg, Charles J. Glidden, J. S. Hathaway, William Carroll Hill, J. B. Millett, Alfred Shrigley, John J. Vanvalkenburgh and Henry Howard.

Recent Pilots' Certificates

The granting of aviation, hydroaeroplane and Expert Certificates by the Board of Governors of the Aero Club of America at its last meeting shows the usual influx at this time of the year of candidates qualifying for these certificates from the "winter" aviation schools. Those to whom aviation certificates were granted include Elliot P. Hinds, No. 625, Martin School, Inglewood, Los Angeles, Cal., Martin TT Tractor equipped with Curtiss OX 90 H.P. motor; Morton P. Lane, No. 626; Atlantic Coast Aeronautic Station, Newport News, Va., Curtiss JN4 Curtiss OX2 90 H.P. motor; Robert R. McMath, No. 627; Atlantic Coast Aeronautic Station, Newport News, Va., Curtiss JN4, and Curtiss OX 90 H.P. motor; Neil C. Mc Math, No. 628; Atlantic Coast Aeronautic Station, Newport News, Va., Curtiss JN4 and Curtiss OX 90 H. P. motor; Nugent Fallon, No. 629, Atlantic Coast Aeronautic Station, Newport News, Va., Curtiss JN4 and Curtiss OX 90 H. P. motor; Walter R. Bullock, No. 630, Atlantic Coast Aeronautic Station, Newport News, Va., Curtiss JN4 and Curtiss OX2 90 H. P. motor; E. R. Kenneson, No. 631, Atlantic Coast Aeronautic Station, Newport News, Va., Curtiss JN4, and Curtiss OX2 90 H.P. motor; Lieut. Ivan P. Wheaton, No. 632, S. C. Aviation Station, Mineola, N. Y., Curtiss JN4 and Curtiss OX2 90 H.P. motor. Hydroaeroplane Certificate No. 62 was granted Mr. Sen Yet Young who qualified from the Newport News, Va., School.

Expert Certificate No. 65 was granted 1st Lieut. G. E. A. Wheaton, U. S. A., who qualified for the rating of Junior Military Aviator on September 4th last.

Cortlandt F. Bishop, second vice-president of the Aero Club of America, and a millionaire, with one of his police dogs, at his country home. Mr. Bishop has been an ardent believer in the future of aeronautics for the past ten years and has made substantial contributions to develop American aeronautics. He is vice-president of the International Aeronautic Federation and secretary general of the Pan-American Aeronautic Federation. Has travelled thousands of miles throughout the world in the interest of American aeronautics, representing the Aero Club of America at meets and meeting and gathering information of helpful nature for the development of American aeronautics.

Blair Thaw Goes Abroad

Blair Thaw, younger brother of Lieutenant William Thaw, the American aviator flying with the French army, sailed with his mother, Mrs. Benjamin Thaw, aboard the Rochambeau December 2. Mr. Thaw said that he was accompanying his mother to assist her in traveling, and was undecided whether he would join the French aviation corps. He has obtained his civilian aviator's license at Mineola, and expects to take out a military pilot's license at the Buc aviation field near Paris.

Burgess News

Rapid progress is being made by the Burgess Company at Marblehead, Mass., on the new Army machine, now under construction for the wireless experiments of John Hays Hammond, Jr., at Gloucester. The craft, which is a seaplane of the Dunne self-balancing type, contains a number of novel features especially provided for the tests which will be made.

The fuselage, which is perfectly streamlined with the radiator in the rear, contains the seats for pilot and operator seated side by side. In front of the operator are the controls for guiding the machine, while surrounding the other seat is the wireless equipment.

During its entire construction, the machine has been under the inspection of Captain Sheppler W. Fitzgerald, U. S. A., the pilot who has been detached by the War Department for carrying out the experiments with Mr. Hammond.

Garden City Notes

Victor Carlstrom piloted the big "Chicago-New York" Curtiss tractor from Governors Island to Garden City on the morning of December 2. This machine is to remain at Garden City as part of the training equipment of the First Aero Squadron.

At 3 P. M., Saturday, December 2, the new Standard "H-3" was flown from Mineola to Governors Island by Overton Bounds, with Ripley Bowman as passenger. In spite of the high wind, a good landing was made at the island, where the machine remained over night. The return trip to Garden City was made early Sunday morning, and preparations made to put the machine through the "slow-speed" test, required by the Government.

Lieut. Miller and Sergt. J. H. Stevenson returned from a flight to Smithtown, L. I., both flying at a good altitude. The machines appeared above the field at about 7,000 feet. Lieut. Miller made a quick descent by steep volplanes, but Stevenson was in no hurry, making the descent in wide circles and easy glides.

An electrical incidence indicating device is attached to the Curtiss machine flown by Capt. Carberry. The device is in the form of a small aluminum vane attached to one of the outer struts. For each of six angles the vane makes to the wind, an electrical connection is made to a corresponding light on the dashboard, indicating that particular angle of flight.

For night flying, a stand has been erected with six electric lights with large reflectors. The lights are spaced about 3 feet apart and about 6 feet above the ground. Current is supplied by a wire run from the "Technical Department," No. 8 hangar.

Army and Navy Orders

Ens. H. W. Hoyt, detached Nebraska; to naval aeronautic station, Pensacola.

Capt. Lewis E. Goodier, Jr. (retired), to Detroit for temporary duty with army aeronautics.

Hampton a Naval Aero Base?

According to a news dispatch in the Newport News papers options on 2,500 acres of land near Hampton, Va., have been secured by Secretary of the Navy Daniels and members of the aeronautical board searching for a site for the new aviation school, it was learned lately. The land is valued at $300,000. It has not been learned whether the Hampton location has been definitely decided upon.

NATIONAL ADVISORY COMMITTEE VISITS DETROIT

THE most important event in Detroit recently was the visit of the National Advisory Committee for Aeronautics. This visit is of great signifficance, as the first co-relation between governmental aviation affairs and that of the large automobile interests. The committee has prepared an official statement as to the purpose of the trips they are making about the country, which is printed herewith:

The committee went to Detroit for the avowed purpose of interesting the automobile industry in the aviation problems of the army and navy. The motor being the most important of these problems at the moment, it was felt that co-operation and probable future manufacturing could be secured by the stimulation resulting from a visit to Detroit. A committee of Detroit men composed of Messrs. Howard E. Coffin, Henry B. Joy, Russell A. Alger, Frederick M. Alger, Sidney D. Waldon and Roy D. Chapin invited for luncheon all the leaders of the industry there.

At the luncheon held at the Detroit Athletic Club, November 220th, various members of the Advisory Committee explained their mission and several of the Detroit manufacturers replied, expressing their desire to co-operate. The committee then inspected the Packard, Hudson and Continental factories as representative plants, and on Tuesday they made a visit to the aviation field, which is being constructed by Henry B. Joy, north of Detroit on the shores of Lake St. Claire.

It is believed that the personal acquaintance and contact which this trip has brought about, will cause the automobile manufacturers in Detroit and elsewhere to take a deeper interest in aviation and assist the Government in its desire for a speedy development of the art.

In response to the demand of the public for increased activity in aviation in both the War and Navy Departments, Congress has now made it possible, by suitable measures and appropriations, to bring about the closest possible co-operation with the industrial strength of the nation.

The formation of the National Advisory Committee for Aeronautics was the first step taken to make such co-operation effective. This committee completely represents the wonderful strength of all departments of the United States Government, and is in a position to co-operate with the industrial world as no other body ever has been. All active departments of the Government organization are represented, as indicated by the following list of names composing the committee, with their titles and duties in the Government service:

Brigadier General George P. Scriven, Chief Signal Officer, U. S. Army, within whose bureau is the aviation division of the Army, under the immediate supervision of Lieutenant-Colonel George O. Squier, Officer-in-charge of Aviation.

The Navy is represented by Captain Mark L. Bristol, Commander of the Air Service, U. S. Navy, at present Commanding Officer of the U. S. S. North Carolina. Closely associated in the Navy with the development of aviation is the Construction Corps of the Navy, and Naval Constructor H. C. Richardson, U. S. Navy, represents this department on the committee, and is also secretary of the committee.

The Bureau of Standards, which is the governmental department that deals with all scientific industrial problems is represented on this committee by Dr. S. W. Stratton, Director of the Bureau.

The United States Treasury is represented by its assistant secretary, Honorable Byron R. Newton, who is in charge of the Coast Guard Service of the United States. This department will probably use aircraft very extensively, and has already started to develop this art within its own organization.

The obvious connection between aviation and weather is made through Prof. Charles F. Marvin, Chief of the Weather Bureau, who has already devoted special attention to the problem of the atmosphere in relation to aeronautics.

Dr. Charles D. Walcott, secretary of the Smithsonian Institution, was closely connected with the earliest work done in the United States by Dr. Langley, with a heavier-than-air flying machine. The Smithsonian Institution has for one of its duties the maintenance of up-to-date records relating to this art, among many others.

To this committee are also attached some of the brightest minds in mechanical and electrical subjects in the universities of this country, and these men are:

(*Continued on page* 344)

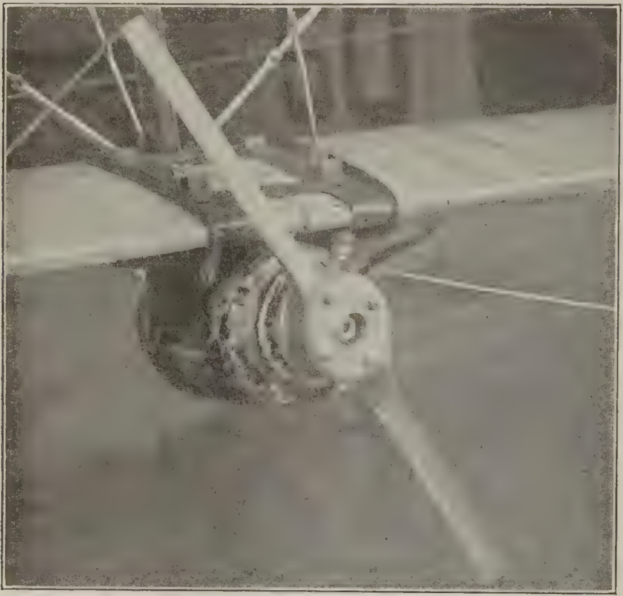
AERO RADIO TELEGRAPHY

First Presentation Results of the Valuable Experimenting Carried on at North Island Aviation School

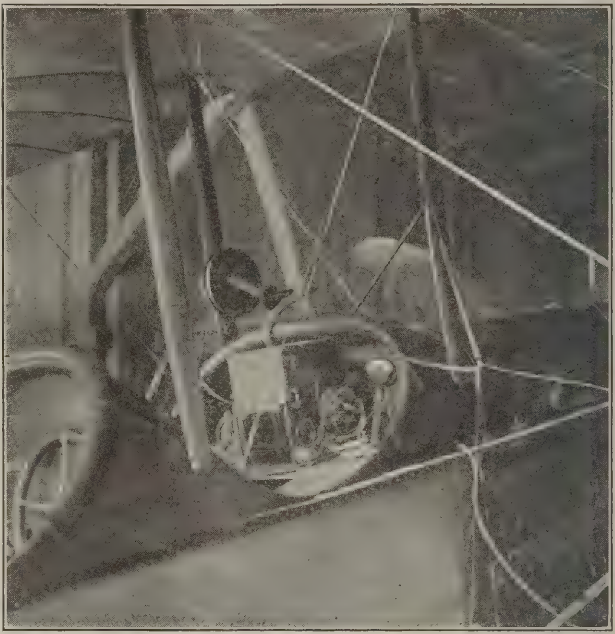
By Allen Henry Wright

IT was not long ago that Col. Willian A. Glassford, U. S. A., in speaking at a luncheon given by one of the commercial organizations in San Diego, Cal., declared that North Island, on San Diego Bay, is the ideal location for an aviation school, and even went further and stated that there is no other place that approaches its suitability for this purpose. He based his opinion upon twelve essential points or virtues, if you please, which the ideal aviation site must possess, including geographical situation, nature of surrounding country, proximity to a manufacturing centre and to navigable water, climate, facilities for land and water instruction, a large, level training field and nearness to military defences.

For some months North Island has been occupied as a training school for military aviators by the United States government through permission from the owner of the property, and Colonel Glassford is the commanding officer there. Some years ago North Island was surveyed and laid out for home-sites for prospective well-to-do residents, but the Curtiss and other aeroplane people began to use it as a site for demonstration and instruction. At the present time, however, it is occupied and used for this purpose only by the federal authorities, and it has been proposed that it be purchased by the government as a permanent aviation base.


The fan-driven generator, which furnished power to send messages over a distance of 140 miles.

At North Island during the past year Capt. C. C. Culver, U. S. A., has been investigating and conducting experiments in the development of an aero radio apparatus of high efficiency under the conditions peculiar to operation on aeroplanes in flight.


View of the cock-pit, showing the arrangement of the set which transmitted 119 miles.

For service use two types of radio transmitting apparatus are desirable, a short range type for use in spotting artillery fire and a long range type for use in reconnaissance. For the first set would require an extreme range not greater than twenty miles, and a small twenty-mile set was developed which worked nicely. The power for this was from storage batteries, and the entire weight of the experimental set was about forty pounds.

Long range sending sets of different types were developed and tried out, and on July 27, 1916, one of them worked successfully over a distance of 119 miles, from Santa Monica to San Diego. This set weighed about sixty pounds, and its power was furnished by two-bladed fan mounted direct upon the generator, developing 180 watts.

Another sending set was constructed and developed, starting with the generator of the signal-corps pack-mule set, model of 1912, this being a self-exciting generator, delivering an alternating current at 110 volts, with a frequency of 500, and an output of one-quarter kilowatt.

This set was developed at the school on North Island, and tests for long range were made on October 26th last. No

Biplane used in Capt. Culver's experiments, showing radio apparatus.

particular difficulty was found in successfully communicating with San Diego while flying over San Fernando and Chatsworth, northwest of Los Angeles and about 140 miles, by airline, from San Diego, the aeroplane being at an altitude of about 7,000 feet. This set had a weight of forty-five pounds.

Working on the principle that telegraph operator properly trained, can receive from any particular instrument in a room when a hundred others are working at the same time, and by amplifying incoming signals by electrical means, no serious difficulty has been found in receiving from low powered stations sixty miles away, while in flight, with the motor running wide open, according to Captain Culver.

In August a number of experiments were made with a machine in flight, equipped with both sending and receiving outfits. These were all successful,, conversation, both sending and receiving, being carried on with the ground station over convenient distances as long as desired.

On September 2, a machine was borrowed from the training department for a few hours, and with one machine equipped with sending apparatus and the other with a receiving set, no difficulty was experienced in communicating between the two while in full flight.

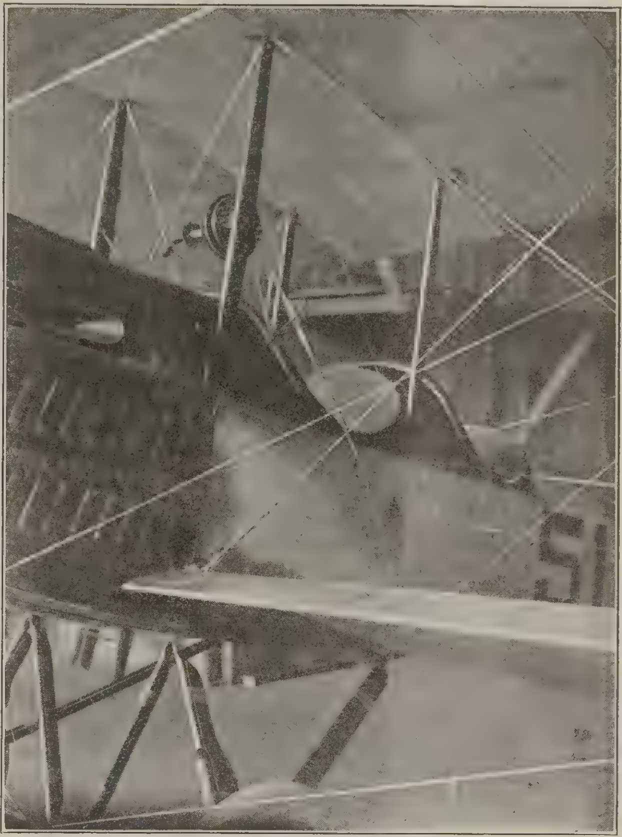
Congressman William Kettner, of the San Diego district was an interested spectator at these experiments, and upon invitation from the officer in charge, wrote a message after the machine equipped with the receiving apparatus had gone into the air and hand it to the officer in the other machine who then ascended it by a radio telegraphy.

The first machine returned to the ground, after successfully copying the message, and handed it to the Congressman, who was intensely interested in the progress which had been made in this branch of the school's work. The flight was at an altitude of about 1,500 feet, and the two machines were some two miles apart when the message was sent and received.

Owing to the proximity of North Island to the high powered radio station on Point Loma, it is very difficult to receive radio signals that may be at all faint while the high power station is working. Arrangements were made with Dr. R. O. Shelton, a practicing physician of San Diego, and an enthusiastic and very capable radio amateur, to receive messages from and communicate with machines in flight during important tests. At times he is assisted by one of the radio force from the North Island school.

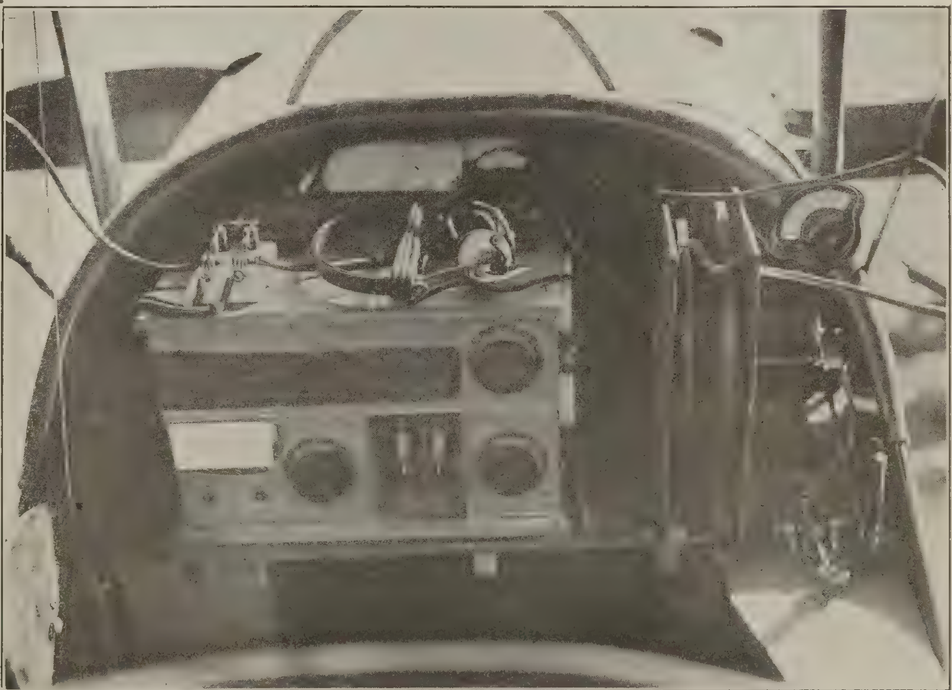
The use of a fan-driven generator permits radio messages to be sent as long as the air speed is sustained, even though motor trouble compels a slowing down or a stopping of the motor. This will permit the transmission of signals giving location and other details as a machine is gliding to the earth when forced to land because of motor trouble.

The trailing aerial which is used in Captain Culver's radio experimental flights is of braided wire of a special design, possessing high electrical efficiency and very low tensile strength. In case of a forced landing, when no time is given to reel in the aerial, the machine may land with the aerial trailing without any danger of tearing out a strut when the aerial catches on the ground as the low tensile strength permits the wire to break easily.



The reel and long copper tube through which the trailing aerial is paid out. This reel has now been replaced by one carried in the cock-pit.

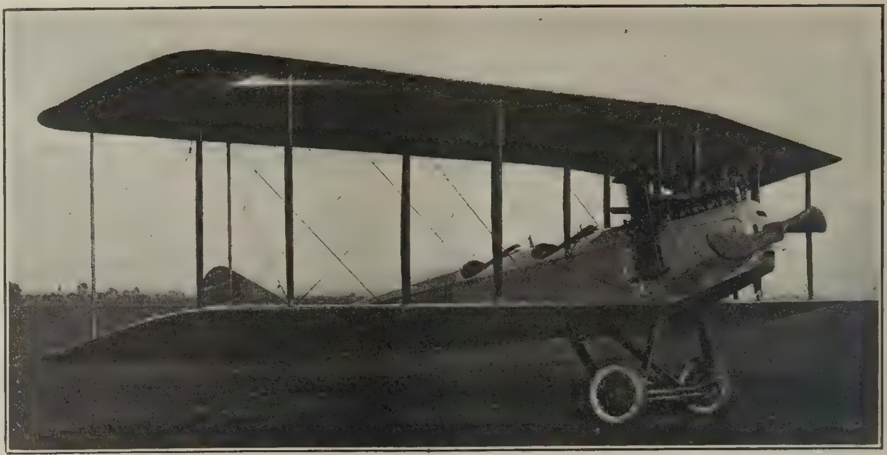
At the North Island school all student aviators are required to learn to use the radio code so that they both can send and receive by radio telegraphy. With the large increase in the number of students and the greatly augmented equipment which was authorized at the last session of Congress, the value of the successful experiments carried on by Captain Culver will be increasingly apparent.



Shows the cock-pit with arrangement of the 140-mile sending set and the experimental receiving set

THE STANDARD "H-3" TRACTOR

By
GEO. F. McLAUGHLIN



A NUMBER of the H-3 tractors have been ordered by the U. S. Government for use in the Army and Navy, after exhaustive tests have shown them to possess many desirable features. Mr. Charles H. Day, Chief Designer of the Standard Aero Corp., is well known for his knowledge of tractor design, and particularly in the design of machines built to Government requirements.

Quick production is made possible by the fact that all branches of the work are done at the Standard factory. Separate buildings are provided for welding, brazing and casting; for painting, varnishing and enameling and for baking enameled fittings to prevent corrosion; for motor testing; for wood working, propeller making, metal stamping, and machine work; and a separate factory for the assembling, crating and shipping of complete machines.

Three "H-3" tractors have been delivered to the 1st Aero Squadron at the training camp at Mineola, L. I., where they are in daily use for instruction purposes.

General Dimensions

Span, upper plane	40′ 1″
Span, lower plane	40′ 1″
Chord	6′ 6″
Gap	6′ 6″
Length over all	27′ 0″
Height	10′ 7″
Gliding angle	1 in 8
Weight, empty	1,700 lbs.
Weight, loaded	2,750 lbs.
Speed range	84-46 M.P.H.
Climbing Speed, 10 minutes	3,500 Ft.
Motor, Hall-Scott	135 H.P.

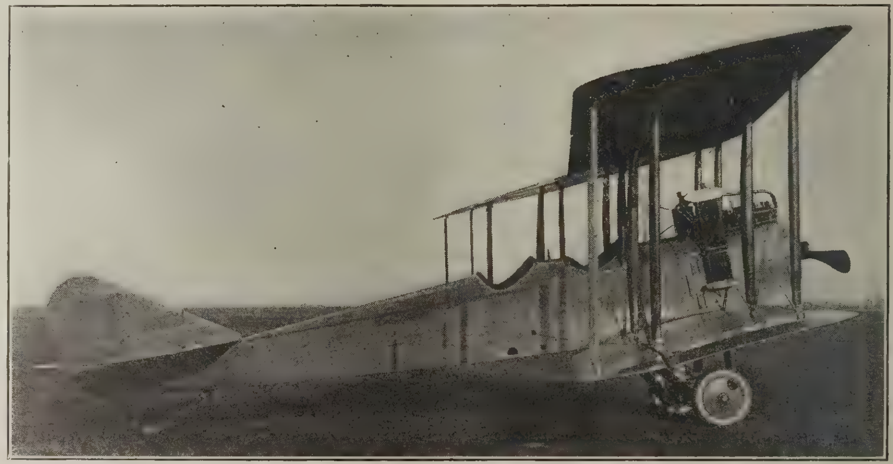
Planes

Planes are swept back at a retreating angle of 10 degrees, staggered 10 degrees (upper plane 1′ 3″ in advance of the lower), and have a slight dihedral of 3 degrees. Central panel above the fuselage, 2′ 8½″ wide. Wing sections extend 18′ 8⅜″ at either side of fuselage.

Chord, 6′ 6″. Forward main wing spars 9″ from leading edge, and spars 3′ 9″ apart, spaced by spruce compression members located where struts occur, and one between each strut rib. Internal wing bracing is with steel piano wire.

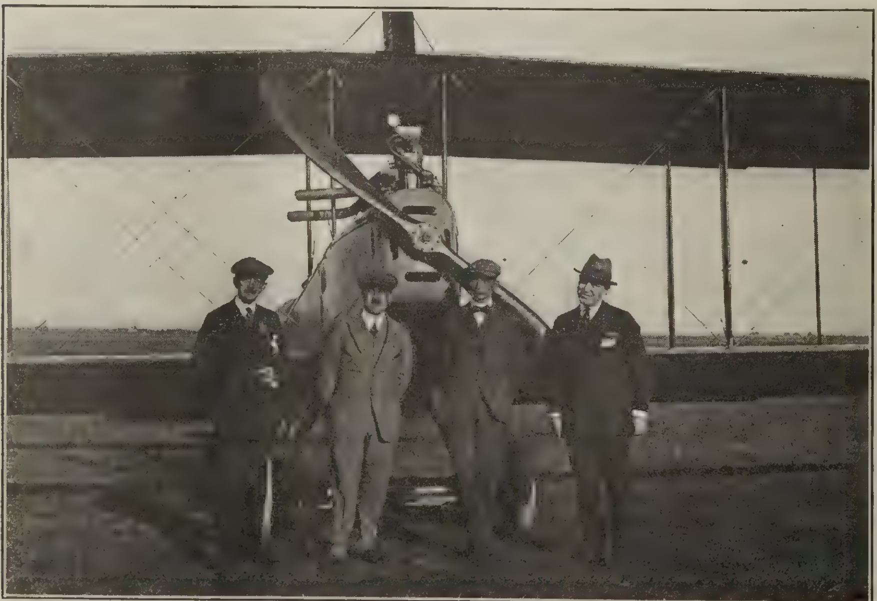
Ribs spaced 11″ apart. They are built to "I" section with channeled spruce battens and webs, mortised, glued and nailed together. Sections sawed from center of webs leaving them as light as possible without sacrificing strength.

Before covering, the wing structure is given a treatment of shellac and varnish to prevent the absorption of moisture which might cause the distortion of the wing. Covering is with unbleached Irish linen treated with four coats of dope and finished with spar varnish.



Four ailerons, each 22½″ wide and 8′ 4″ long, attached by 3 hinges. Each aileron has a surface of 15½ sq. ft.; total area, 62 sq. ft. Two light spruce struts connect each upper with lower aileron. Two cables from trailing edge of upper aileron run to a pulley located at the lower rear outer inter-plane strut fitting. From this pulley the cable runs direct to the control column in the pilot's cockpit. Cables from lower aileron run to upper end of outer rear strut, the cable running beneath the upper plane and connecting the two pairs of ailerons, thereby causing them to work synchronously.

Gap between planes, 6′ 6″. Tapered struts, inner set located 7′ 0″ from fuselage; outer set 14′ 6″ from fuselage. Outer struts are of slightly lighter section than inner struts. Strut ends metal tipped and attached to sockets by a single removable pin. Strut sockets of welded sheet steel, attached to wing spars by four bolts which clamp the socket to the spar without piercing.



The officials of the Standard Aero Corporation of New York: Vice-President W. D. Judkins; President Harry Bowers Mingle; Chief Engineer C. H. Day, and Treasurer Meenan

Fuselage

Fuselage 25′ 0″ long. Width at forward cockpit, 2′ 9″; depth 3′ 6″. At the pilot's cockpit, 2′ 6″ wide, 3′ 3″ deep. Longerons of ash, 1 3/16″ square, tapered toward the tail.

The rounded nose of the fuselage is of hand-shaped sheet aluminum. Fuselage covering in the vicinity of the engine is aluminum, attached to longerons with short wood screws. At the top of fuselage, the cylinder heads of the motor project slightly above the cowling. The cowling is rounded and carried straight back as far as the cockpits. From there the fuselage top is covered with linen, carried on narrow strips of spruce resting on curved formers. Covering is attached by eyelets and lacing, eliminating the use of tacks. Fittings are of sheet steel, with joints welded.

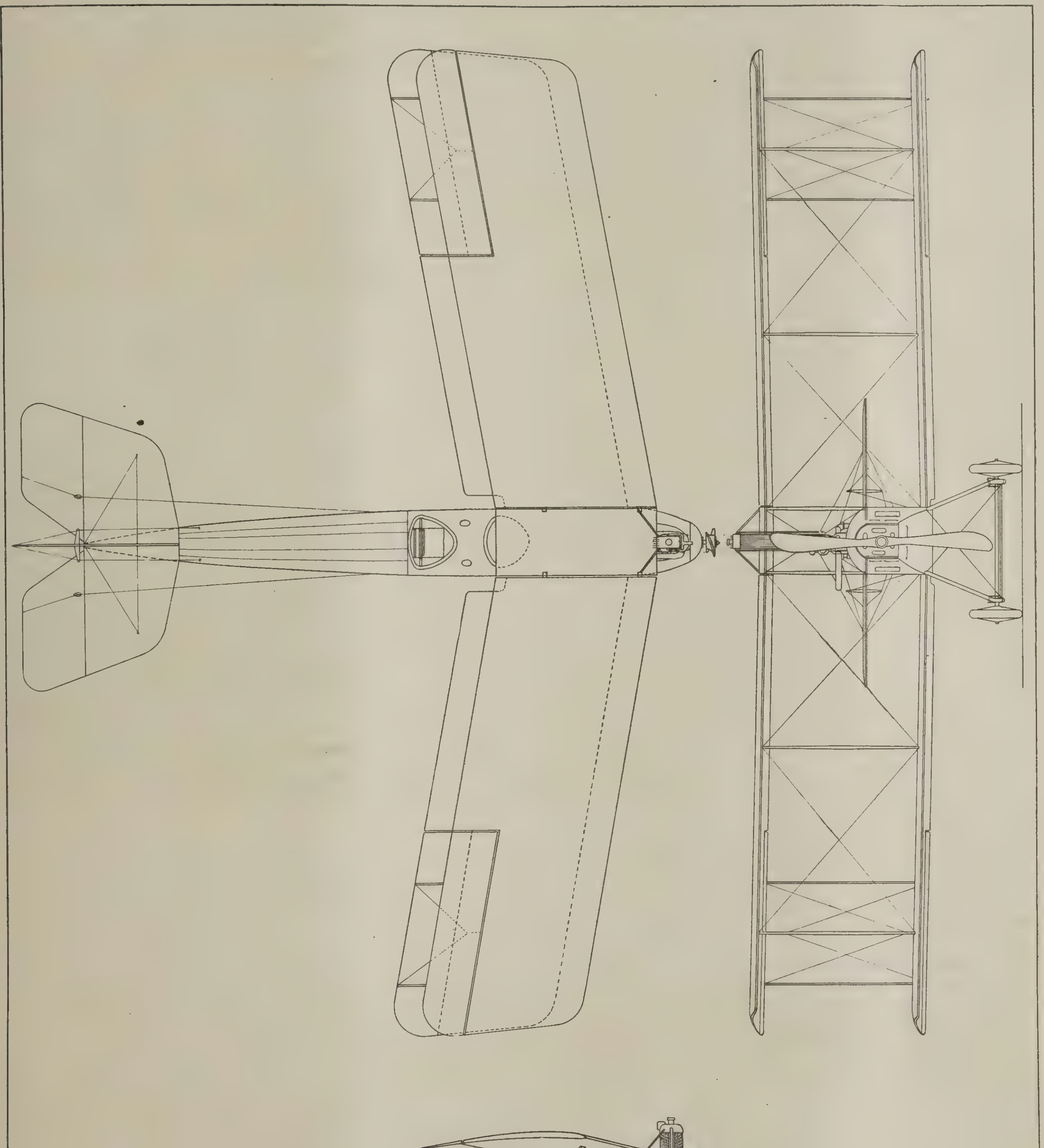
The forward cockpit for the passenger is situated behind the struts, and because of the fact that there are no wires or other obstructions floored with veneer.

Single control is installed, and is changeable in five minutes from Dep to Curtiss. When Dep control is used, the Curtiss shoulder yoke for the aileron control, is folded back out of the way. All cables are run over ball bearing bronze pulleys. Where controls pass over pulleys, steel sprocket-chain is used.

Instruments which are part of the regular equipment supplied with Standard machines, and arranged on the dashboard, are: Foxboro Buoyancy Meter; Tycos Altitude Meter; Phinney-Walker clock; Foxboro oil and air pressure meters; Puritan magneto switch which connects either or both magnetos; map board; pressure pumps for gas and oil; cut-out switch.

A Warner Tachometer is driven by a flexible shaft attached to the camshaft of the motor. A Pyrene fire extinguisher is held in a bracket on the floor. By means of a speaking tube, conversation can be carried on between the pilot and passenger. A detachable leather lining is

(*Continued on page* 345)



STANDARD TRACTOR
MODEL H-3

AEROMARINE COMPANY INSTALLS DYNAMOMETER

KEEPING abreast of the rapid strides being made in the manufacture of efficient aero-motors, the Aeromarine Plane & Motor Company has installed in its factory, at Nutley, New Jersey, a most modern appliance for determining the horsepower of motors—The Sprague Electric Dynamometer.

Although some manufacturers test one or two motors of a given size, and rate the remainder of their production in this size on the results obtained, the Aeromarine Co. makes an individual test of each motor that leaves its factory. Each motor comes to its purchaser with a record of its actual performances under various speeds, and the purchaser can absolutely rely upon its record. Accuracy of results is one of the important characteristics of the Electric Dynamometer. Official acceptance tests based upon electric dynamometer readings can never be questioned. Added to this important feature are the factors of convenience, flexibility and economy of this method of testing.

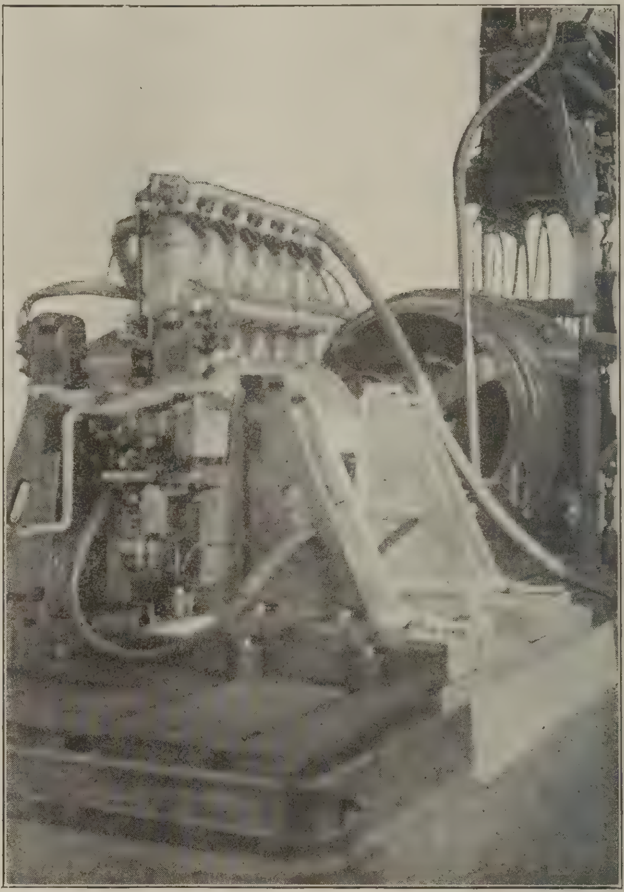
The majority of the leading automobile builders have already installed these Sprague electric dynamometers, and farsighted manufacturers of aeroplane motors, realizing the need of dependable calculations and appreciating the advantages of this testing system, are now making use of the special dynamometers which have been developed for aeronautical motor work.

The testing room of the Aeromarine Plane & Motor plant is in a small building set apart from the main factory, where it is free from disturbing influences. The engines are brought to the testing stand on an overhead trolley and require a minimum of handling. Specially designed adjustable supports are used to mount the engines and to properly align it with the testing dynamometer.

Both engine and dynamometer are mounted upon a very heavy cast iron bed plate which is provided with T-slots for the adjustment of the engine stands of the dynamometer pedestals. The base is mounted upon a solid concrete foundation raised a foot from the floor, bringing all apparatus into a very convenient position for testing.

Connection between the engine and dynamometer is quickly and easily made by means of a flexible coupling. An important feature of the installation is the use of the electric dynamometer for cranking the engine preliminary to the test. An automatic control panel is provided, by means of which the load and speed of the engine in test can be varied throughout its entire range. The variation of load and speed are accomplished by the simple turning of a field rheostat handle by very fine increments.

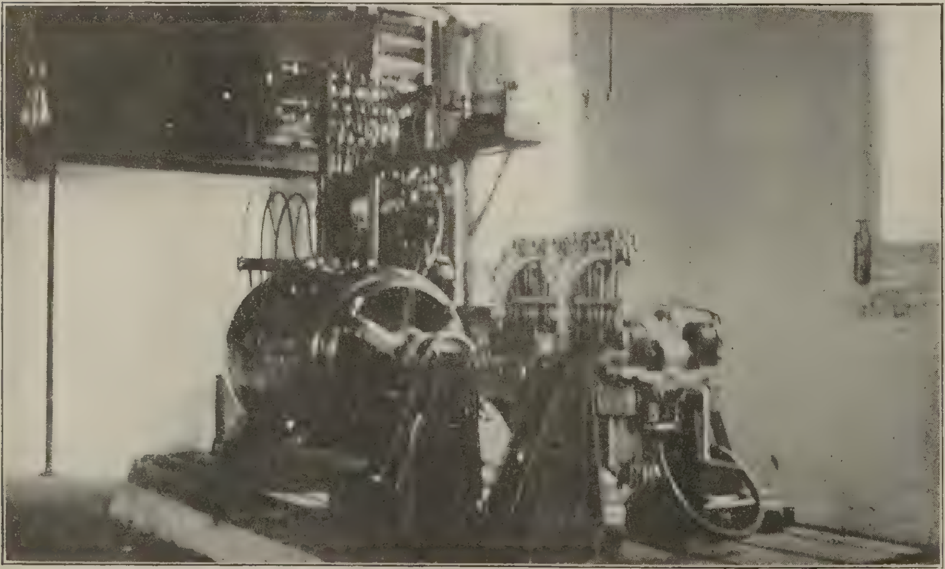
Horsepower readings are quickly and easily obtained from the tongue indication on the scales of the dynamometer and the speed indications on a specially designed electric techometer. An electrically operated revolution counter registers the total number of revolutions during a test. A specially designed gasoline metering device is provided so that measurements of fuel consumption can be made. The disposition of the measuring apparatus is such that practically the entire test can be conducted by one man.



The illustrations show the Aeromarine six-cylinder motor in test. The dynamometer is suitable for testing motors of a horsepower as high as 300 at 1,500 r.p.m., and at speeds up to a maximum of 3,500 r.p.m. The dynamometer is so sensitively balanced, however, that it can be used for measuring horsepower as small as five, and the speed can be controlled from zero up to its maximum and through all intermediate variations.

The dynamometer is not only useful in measuring brake horsepower, but it is well adapted to make acceleration tests of the carbureter, fuel consumption tests and tests of internal friction for the ascertaining of the mechanical efficiency of the machine.

The complete apparatus, including the base, engine stands and all accessories, was designed and manufactured by the Sprague Electric Works and installed under their supervision.



Aeromarine motor being tested by the Sprague dynamometer

THE MARTIN STABILIZER

IN our last issue we printed a news item calling attention to the tests which have recently been made of the Martin stabilizer at Mineola, Long Island. This week we take pleasure in reproducing photographs and the official report sent to the Aero Club of America by Mr. Allan S. Adams, who made the tests.

The report is as follows:

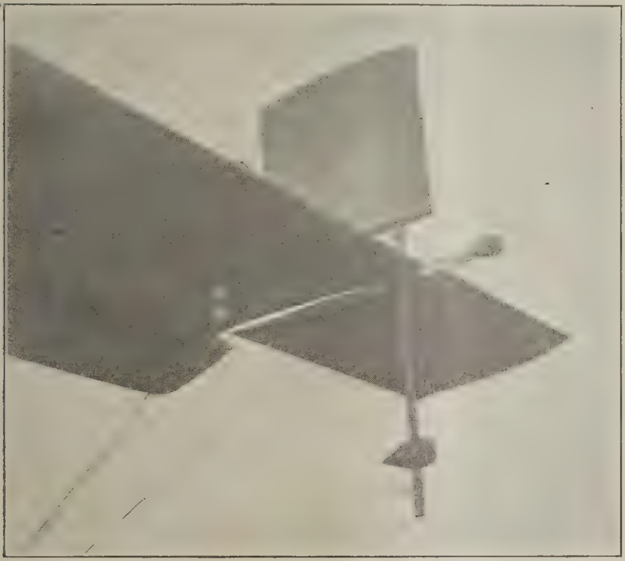
"From the several flights which I have made on the J. N. 4 No. 76 to test the working of the Martin Aerodynamic Stabilizer, the following facts have been established:

"The aeroplane remains in a horizontal position when a straight course is pursued.

"The aeroplane takes its own bank and holds same on a turn.

"I have tried in different ways to make the aeroplane slip or skid, but it refused to do so. As you know, I have spiraled with motor off from considerable heights.

"The stabilizers seem to care for any movement which an aviator could desire the aeroplane to make, and are quite sensitive to movements of the rudder."



Captain James V. Martin himself makes the following claims based on the tests made at Mineola almost daily since November 6th, including a flight to Princeton and back in a twenty-five-mile wind:

"1. The aeroplane in straight directional flight whether progressing in a horizontal plane or ascending or descending is maintained at all times in the lateral horizontal.

"A. Gusts are more quickly corrected by the stabilizer than is possible when operator controls.

"B. No tendency to roll is perceptible.

"2. The aeroplane is exceedingly sensitive to its vertical rudder and takes and holds a definite bank for every angle of the rudder.

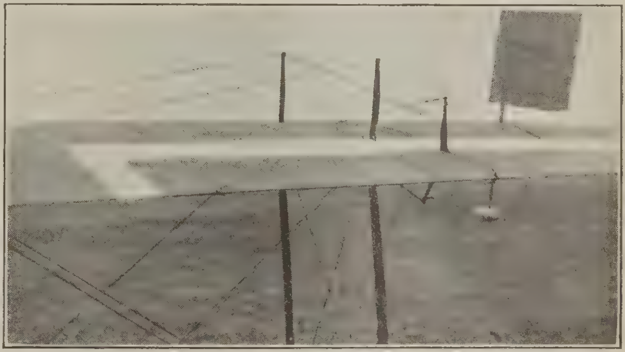
"3. The aeroplane glides and spirals perfectly with motor cut out.

"4. The stabilizers are at least four times as powerful as the usual ailerons, and therefore they can be reduced one-half in size and weight and still be sufficiently powerful.

"5. The aeroplane appears just as speedy and controlable as it was before the stabilizers were installed.

"6. The aeroplane cannot be made to slip or skid."

The Club officials are considering the claims and will ask the Army and Navy authorities' opinion about it. If it is found that the Martin Aerodynamic Stabilizer is the greatest achievement in aviation in 1916, Capt. Martin will be awarded the Collier Trophy, which was awarded in past years to Glenn H. Curtiss for the development of the hydroaeroplane and flying boat, to Orville Wright for the Wright Automatic



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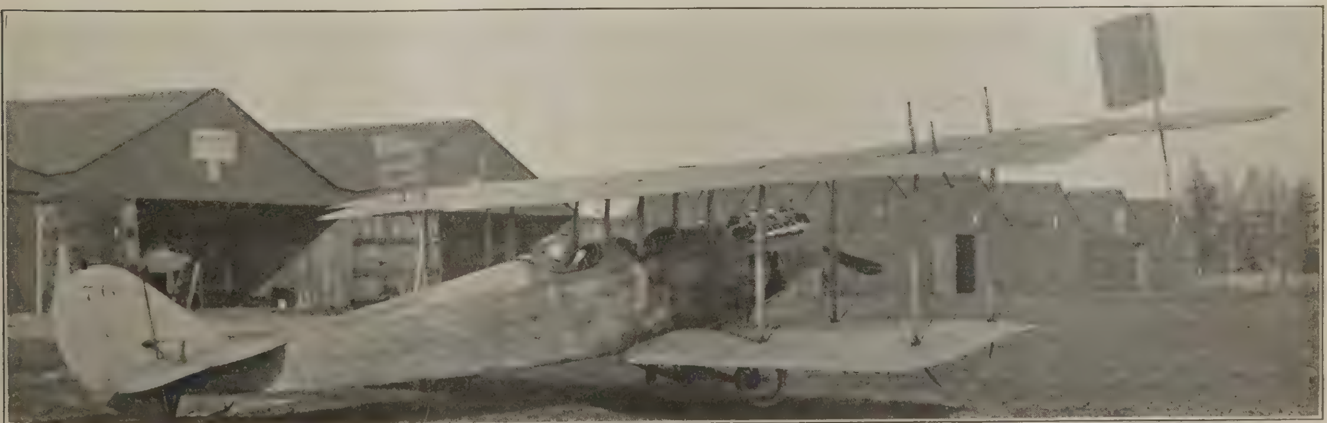


The Pan-American Aeronautic Exposition

The First, Second and Third Floors Are Reserved for Aeroplanes, Motors and Accessories.

The Exposition will comprise the most up-to-date products of the American Aeronautic Industry and includes:

THE ARMY AND NAVY AERONAUTIC EXHIBITS.

NATIONAL GUARD AND NAVAL MILITIA SECTIONS.

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS' EXHIBIT.

AERO CLUB OF AMERICA & PAN-AMERICAN AERONAUTIC FEDERATION SALONS.

AERO COAST PATROL EXHIBIT.

AMERICAN SOCIETY OF AERONAUTIC ENGINEERS (Standardizing section).

INTERCOLLEGIATE SECTION.

AERO MAP & LANDING PLACE EXHIBIT.

WEATHER BUREAU EXHIBIT.

BUREAU OF STANDARDS EXHIBIT.

PAN-AMERICAN UNION EXHIBIT OF RELIEF MAPS, ETC.

COAST GUARD EXHIBIT.

POST OFFICE EXHIBIT OF MAPS & LOCATIONS OF 200 PROPOSED AERIAL MAIL ROUTES.

SMITHSONIAN INSTITUTE EXHIBIT.

DIRIGIBLE BALLOONS.

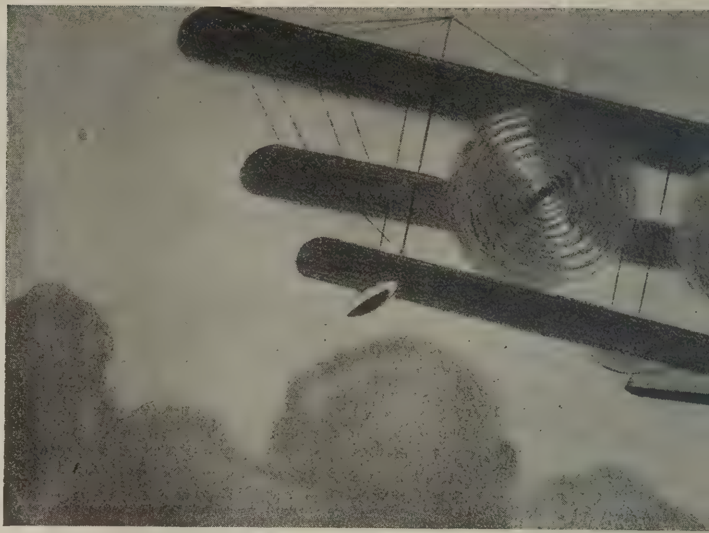
BALLOONS.

MOTION PICTURE HALL.

ASSEMBLY HALL.

PRESS ROOM.

The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos-Dumont, Honorary President, Pan-American Aeronautic Federation.



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TRAL PALACE
RK CITY

8 to 15, 1917

HOWARD E. COFFIN, Chairman
SITION, 297 Madison Avenue, New York
rray Hill, 71-72
N 50 CENTS

The interest in the First Pan-American Aeronautic Exposition is fivefold:

(1) The military authorities of practically every country of the world will send representatives to the Exposition to see what the American aeronautic industry is producing.

(2) Owing to the large number of prominent men who have taken up aviation in the past year, there is a popular interest which promises to give the Exposition the social aspect which is needed to make it popular;

(3) Owing to the remarkable work of aircraft in the past year and the campaign to build our aerial defenses, the public in general is taking a special interest in the Exposition, and large crowds can be expected to attend it to see what military aeroplanes are and what this country can produce to meet any emergency;

(4) Owing to the fact that U. S. Congress has appropriated close to $20,000,000 for building its aerial defenses, and that the aeronautic business to be done in this country for the coming twelve months will amount to about $50,000,000, the engineers and technical people of every line of human endeavor are becoming interested and will welcome the opportunity of seeing at the Exposition just what this country is doing in aeronautics;

(5) Next year there is going to be a big aviation meet at Rio de Janeiro, for which the Aero Club of America has offered a $5,000 trophy and $5,000 in prizes; after the races there will be held the Transcontinental Aeroplane Contest in the United States for which a $20,000 first prize is offered. Plans are now being made to have the Pan-American aviators who participate in the Pan-American races at Rio de Janeiro come to the United States to compete in the Transcontinental Aeroplane Contest. This and other aeroplane competitions to be held next year will bring to the Exposition many people from the different American republics which are planning to compete in these contests.

During the Exposition there will be held a series of conferences, at which the aeronautic authorities of different countries will discuss important phases of aeronautics and submit and outline plans to foster greater developments in the utilitarian, military and scientific branches of aeronautics.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

MODERN PROCESSES FOR THE TECHNICAL PRODUCTION OF HYDROGEN FOR DIRIGIBLE AIRSHIPS AND BALLOONS

Linde-Frank-Caro Process—A Physical Liquefaction Water Gas Process

By HARRY L. BARNITZ, Ph. G.

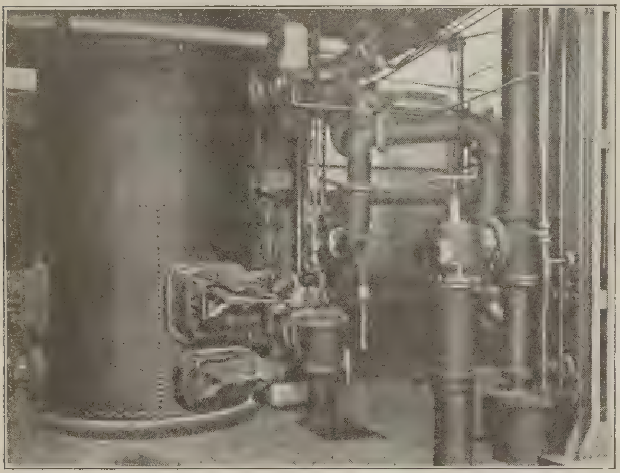
(*Copyright*, 1916, *by Harry L. Barnitz*)

PART III OF A SERIES OF THREE ARTICLES.

[In the following article the writer gives valuable data covering knowledge gained by 16 years' experience specializing in research work on the Technical Production and Application of Hydrogen. His long association in this field has made his counsel much sought by many of the largest industries in this and foreign countries. Mr. Barnitz has installed many plants here and abroad and is leading authority in the United States on the production and application of hydrogen.—ED.]

PART III.

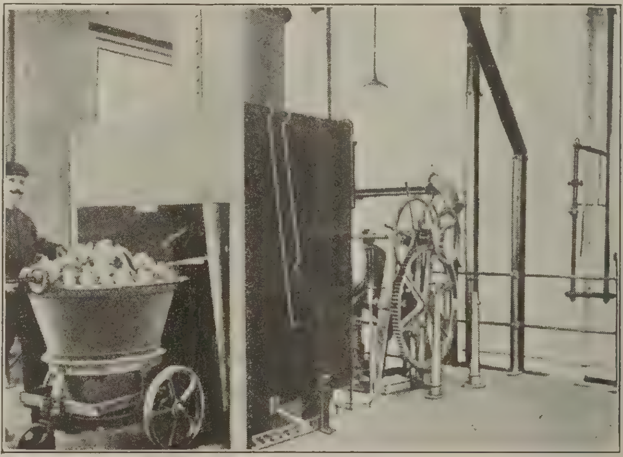
IN this process water gas, consisting almost solely of carbonic oxide, CO, and hydrogen, is cooled and compressed until the carbonic oxide is liquefied, while the hydrogen still remains gaseous and can be drawn off. The apparatus consists essentially of a water gas plant and a plant for the separation of the hydrogen from the carbonic oxide gas.



Water gas generator as shown below the working stage in the Hydrogen Gas Works, Borsigwalde

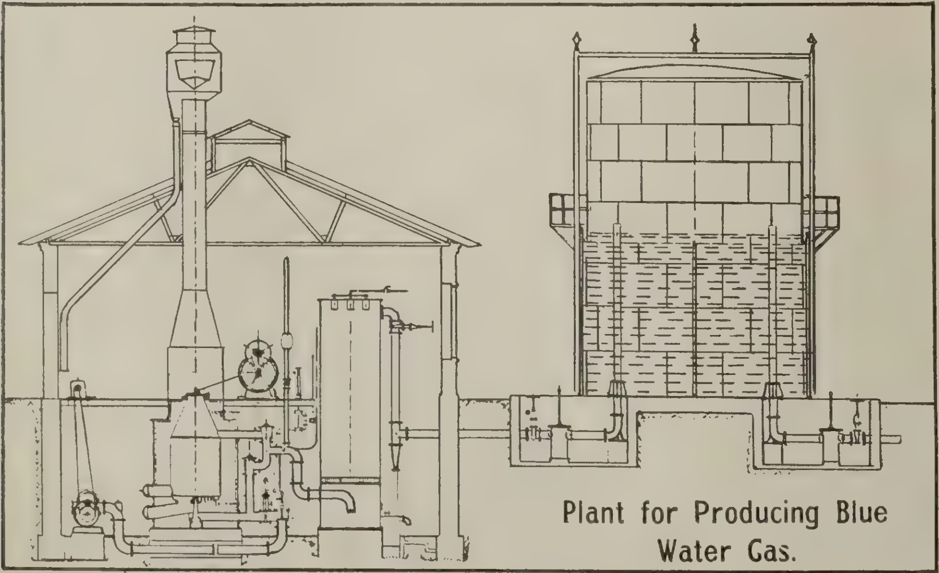
The water gas is produced in the usual way by passing steam through incandescent coke, whereby the steam is decomposed, its oxygen forming carbonic oxide with the carbon of the coke, while its hydrogen remains free. Water gas, on the average, consists of hydrogen, 50 per cent; carbonic oxide, 40 per cent; carbonic acid, 4 per cent; nitrogen, 5.5 per cent; methane, 0.5 per cent, with smaller proportions of oxygen, sulphurated hydrogen, and carbon bisulphide.

The hydrogen is separated from the rest of the gases by compression and cooling. The boiling point of hydrogen—253 degrees C.—is much lower than that of the other constituents, that of carbonic oxide being 192 degrees C., and that of nitrogen, 196 degrees C. On cooling compressed water gas to the temperature of liquid air—193 degrees C.—all of the constituents except the hydrogen are liquified. The hydrogen thus is easily separated in the gaseous state.

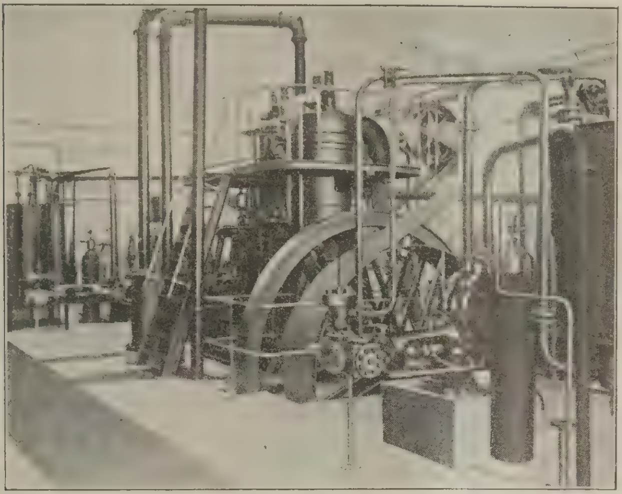


Water gas generator as seen from the working stage of the Hydrogen Gas Works, Borsigwalde

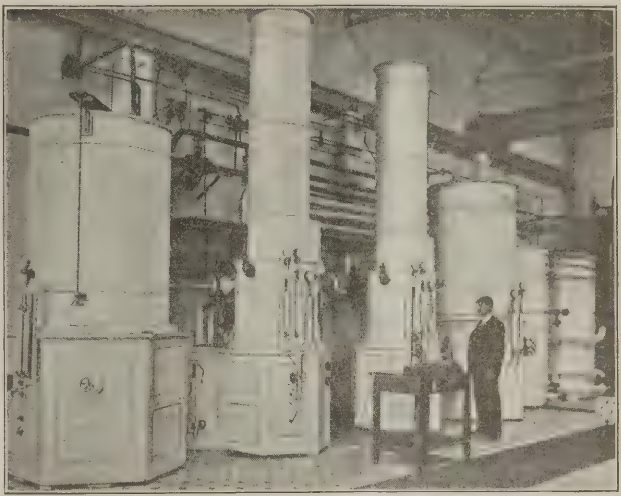
Before this separation by cooling is attempted, the water gas undergoes preliminary treatment for the extraction of carbonic acid, which, if not removed, would block the narrow tubes of the rectifying apparatus. The removal of the carbonic acid



Arrangement of a plant for the production of blue water gas



Engine room with gas-engine for driving the Hydrogen Gas Plant, Borsigwalde

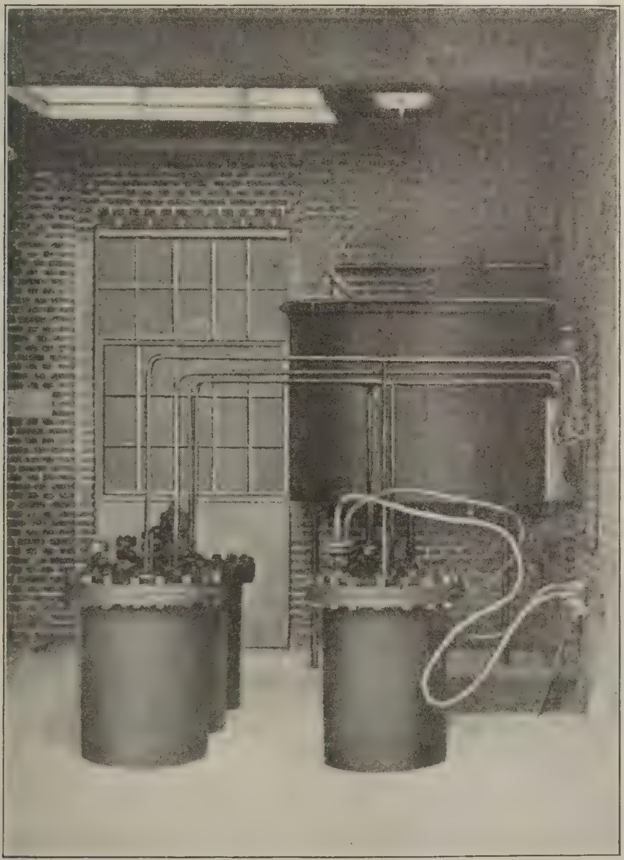


Preliminary cooler and separator in the Hydrogen Gas Works, Borsigwalde

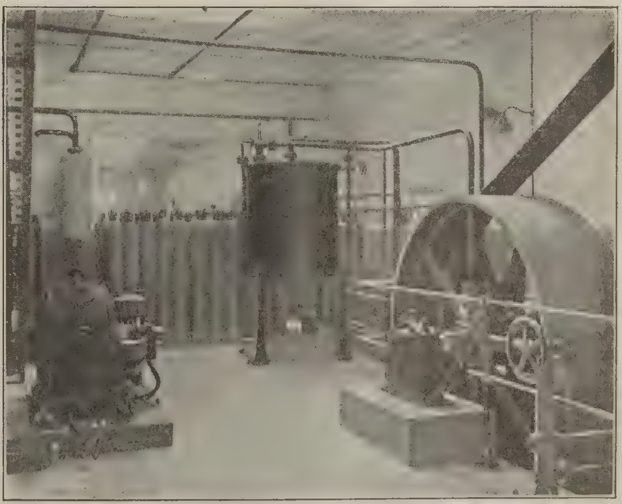
gas is affected for the most part by compressing the water gas, in contact with cold water, up to a pressure of about 12 atmospheres. At high pressure water absorbs carbonic acid more easily than at atmospheric pressure, and hence the quantity of water required for absorption is reduced. The small residue of carbonic acid still remaining in the water gas is extracted by passing the latter through caustic soda.

This method of compressing water gas and cooling it by liquid air produces hydrogen 97 to 98 per cent pure. The residue consists of about 1 per cent each of carbonic oxide and nitrogen. Sulphur, dust and moisture are absent from the gas. The hydrogen leaves the apparatus under a pressure of 25 atmospheres. Two to four skilled men are required to operate a plant, depending on its size. The plant is kept in continuous operation for about a week; it is then necessary to shut down the hydrogen separating section in order that all the worn tubes may be cleaned. A second unit of this section of the plant is kept in reserve for use while the first unit is being cleaned. To bring the entire plant into operation requires twenty to twenty-four hours.

As previously stated in part first, the Linde-Frank-Caro process could not be considered practical for aeronautics due to the great amount of auxiliary equipment and skilled labor required. Another serious factor to be considered in this process is that it is necessary to discontinue the hydrogen separating section every seven or eight days in order that all worn tubes may be cleaned. The initial outlay of an installation of this type is excessive and the gas generated from this process is costly.



Carbonic-acid washer for water gas in the Hydrogen Gas Works, Borsigwalde



Cylinder-filling station for nitrogen in the Hydrogen Gas Works, Borsigwalde

FOREIGN NEWS

FRANCE

The American aviation corps has gained a new distinction. Adjutant Ralph Lufberry has been designated an "Ace."

An "ace" is an aviator who has brought down five enemy aeroplanes—that is, five whose destruction has been completely and officially confirmed. There are just twenty-one "aces" in all the French aviation service—and Lufbery is No. 21. That number, 21, represents the exact number of German Aviatiks which the Franco-American flying squadron has brought down, according to official count. Many more have probably been downed, but French official lists take cognizance only of machines whose destruction has been officially confirmed.

The American squadron, as it is now constituted, in addition to two French officers, Capt. George Thenault and Lieut. De Laage, consists of:

Lieut. William Thaw, Adjutants Didier, Masson and Ralph Lufbery; Sergeants Charles Johnson, Lawrence Rumsey, Dudley Hill, M. Savelka of Madison, Conn.; Robert Rockwell and James Maccamel; Corporals Soubrian, Kairland and Frederick Prince.

The corps has had four killed—Chapman, Kiffin, Rockwell and Prince, and two wounded—Lieut. Thaw (now in America) and Balsey of Texas, who is injured for life.

GERMANY

A German official statement of the Zeppelin raid over England admits the loss of two Zeppelins.

"On the night of November 27-28," says the official statement, "several German naval airships successfully bombed blast furnaces and industrial establishments in middle England. At several places conflagrations were observed. An airship was shot down by the enemy near Scarborough and another has not returned, so it must be considered lost. The remaining airships returned and landed."

The recent report that the Russians brought down a large Zeppelin airship east of Pinsk, on the Russian front is officially denied.

"Russian newspapers have spread a report that the Russians, in the Sarny district, southwestern, shot down a Zeppelin, made prisoners of its inmates to the number of 26 and captured 300 kilograms of bombs, two cannon and two machine guns," says the statement. "It is officially stated that this report is invented."

The wrecking of a super-Zeppelin in a storm on Tuesday is reported by travelers from Munich reaching Amsterdam, says an Exchange Telegraph dispatch from Amsterdam. They report there was only one survivor of the crew of twenty-eight.

The Zeppelin is said to have been on the way from Friedrichshaven to Wilhelmshaven on its first voyage, when it was blown out of its course and fell in the woods near Mainz.

The commanders of the two Zeppelins destroyed in the recent raid on England were Lieut. Commander Deitrich and Lieut. Frankenberg. Lieut. Commander Deitrich formerly was a Captain of the North German Lloyd. He distinguished himself by his exploits in the early weeks of the war in eluding a British cruiser and taking the steamer Brandenburg, from Baltimore to Trondhjem, Norway.

The Brandenburg put to sea late in August of 1914, after having been pursued by a warship on her voyage from Bremen, which she completed on August 5. She escaped from a British cruiser which was awaiting her and was last heard from on August 25, when passing Asbury Park, N. J.

GREAT BRITAIN

On the night of November 28th, the German Zeppelins made another attack on the northwest coast of England. Official reports do not state how many crossed the coast, but apparently they were bombarded so severely by anti-aircraft guns, as well as being fiercely engaged by British aeroplanes, that they were unable to do much damage. Lights were turned out in all the towns in the effected districts as soon as reports of the approaching ships were announced.

One Zeppelin dropped its cargo of bombs in Yorkshire and Durham, and being attacked by a single aeroplane, fell in flames off the Durham coast. Another got as far as the North Midland counties and likewise dropped bombs. Naval sea-planes were awaiting her, and assisted by an armed trawler, they brought her down.

The official English report follows:

"A number of hostile airships approached the northeast coast of England between ten and eleven o'clock last night. Bombs were dropped at various places in Yorkshire and Durham. The damage is believed to be slight.

"One airship, attacked by airplanes of the Royal Flying Corps, was brought down in flames into the sea off the coast of Durham. Another airship crossed into the North Midland counties and dropped bombs at various places. On her return journey she was repeatedly attacked by airplanes of the Royal Flying Corps and guns. She appears to have been damaged, for the last part of the journey was made at very slow speed. She was unable to reach the coast before day was breaking. Near the Norfolk coast she apparently succeeded in effecting repairs and was proceeding east at high speed and at an altitude of 8,000 feet when she was attacked nine miles out at sea by four machines of the Royal Naval Air Service and an armed trawler and was brought down in flames at a quarter to seven A. M.

"The latest police reports show that the damage and casualties were very slight, although more than one hundred bombs are known to have been dropped. One woman died from shock, while five men, seven women and four children were injured.

"In one town fifteen houses were seriously and twenty slightly damaged. At other places in which bombs were dropped the damage was insignificant. There was no military damage of importance."

King George has awarded the Distinguished Service Order to Sub-Lieutenant Edward Pulling and the Distinguished Service Cross to Lieutenant Egbert Cadbury and Sub-Lieutenant Gerrard Fans, all of the naval air service, in recognition of the destruction of a Zeppelin off the Norfolk coast after Monday night's raid.

The Aeroplane, published in London, in a recent issue has a very interesting article on the British Air Service, under the caption, "Our Distressful Air Service." The section of the editorial which speaks of the Royal Naval Air Service is particularly interesting, as the points brought out apply in a greater or lesser degree to the United States.

"One recalls," says the editorial, "that a solitary seaplane distinguished itself in the battle of Jutland, but it is admitted that the German Zeppelins did excellent service before the battle. Doubtless I shall be corrected if I am wrong, but it seems to me that, if we had a number, say a dozen, of really fast seaplane carriers which could have operated far ahead of the fleet, we could have learned at least as much of the Hun's movements as they knew of ours, and could have prevented their airships from learning anything at all.

"Granted that there was 'low visibility,' which means more or less of a fog, inherently stable seaplanes could have wandered through it by compass, and above it they would have found the airships at their mercy.

"One admits the difficulty of dumping a seaplane overboard in a heavy sea, but one did evidently get off, so why not more? And in any case why trouble to get a machine off the sea? It is certainly not less than four years ago since Lieuts. L'Estrange-Malone and Gregory, R. N., flew off the decks of ships while under way, and it is at least as long since Mr. Glenn Curtiss alighted on the deck of a ship at anchor."

(*Editor's note. It was Eugene Ely who flew from a ship at anchor and later landed on the deck of a ship at anchor. Mr. Glenn Curtiss flew up to the side of a battle-ship and was hoisted to the deck by a crane.*)

"May one ask what our high-brow scientists have done in two years of peace and two years of war to improve these performances?

"The real seaplane carrier should have a speed of 40 knots when pressed. It is essential that she should have a speed greater than any destroyer or cruiser that the enemy could send after her, for she would be unarmored and practically unarmed, except perhaps for a big stern chaser and some anti-aircraft 'Archies.' Her job would be to run, not fight, and to run so fast that she could round an enemy squadron and keep her rendezvous with her aeroplanes after leading the enemy away from it.

"Moreover at 40 knots, practically no auxiliary power would be needed to launch an aeroplane from her decks, because even in a flat calm the machine would be almost at its lowest flying speed before it started, and against anything of a breeze it would have flying speed to spare.

"Similarily, in alighting, the aeroplane would be able to slow down till it hovered over the landing apparatus at the same speed, and would drop at the opportune moment. And thus the mere speed of the ship would wash out half the problems of launching and alighting."

The editor then goes on, and shows how, with an efficient Naval Air Service at the beginning of the war, various raiders, like the Emden, the Konigsberg, and the Karlsruhe could have been searched out and spotted for the war-ships. The problem of warding off submarine attacks would have also been solved, as the seaplanes can operate in any wind which would allow accurate shooting on the part of a submarine.

The editor is very strongly in favor of what he calls "Building in" as practised in the Navy. By "Building in," is meant the practise of sending the officer who will have charge of the completed ship to the works to watch the ship in its construction. In this way the officer learns ahead of time all the peculiarities of the ship he will command, and when the ship is completed and any trouble crops up he is in a much better position to know just what is wrong and what the remedy is.

It seems, however, that those in command of the R. N. A. S. have issued orders that until quite recently, no R. N. A. S. officer was permitted to visit an aircraft factory without special leave.

The editor thinks that engineer officers and mechanics should be "Built in" with new types of engines.

JAPAN

The following is from the Japan *Times* of November 4th:

The Tokorozawa aviation corps which was scheduled to leave Tokorozawa on November first for Kurume to participate in the army maneuvers did not depart on November first on account of the heavy rain.

However, early yesterday morning, as the weather had cleared up, they prepared for the long distance flight to Toyohashi, and at half past six four aeroplanes piloted by Lieutenants Saito, Takemiya, Niiyama and Takikawa left Tokorozawa. They passed Shidzuoka at 8.20 and arrived at the military grounds at Toyohashi at twenty minutes past nine.

The first section of the long flight to Kurume was successfully accomplished without mishap, and the four pilots will steer their machines from Toyohashi for the second section of the trip. It is reported that the first section was covered in much better time than had been anticipated.

AVIATORS ARRIVE AT HIMEJI

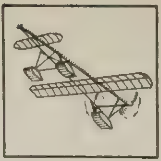
The four aeroplanes of the Tokorozawa aviation corps, which arrived at Toyohashi yesterday morning, resumed their aerial trip after a two hours' rest. They left Toyohashi ground at 11.15 a. m. and after crossing Ise bay and flying over Nara, Hiyodorigoye pass, Osaka and Kobe, safely arrived at Himeji between 3.09 and 3.15 p. m. except one aeroplane which arrived towards dusk, the machine having missed its course after passing Tsuge, in Iga.

The following is from the Japan *Times* of November 8th:

On Sunday morning Lieutenant Saito of the Tokorozawa aviation corps, with Lieutenant Arita as a passenger, left for Kumagai, where they arrived without mishap the same morning. On preparing to leave again, however, it was found that the engine was out of order. The machine mounted some distance, when owing to continued engine trouble the aeroplane suddenly came to earth and was broken into pieces. Fortunately neither aeronaut was injured in the fall.

MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



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Scientific Models

Perhaps there is no one thing in model aeronautical circles that has given rise to so much discussion since model activities began, than the relative merits of model flying as a science and as a sport. In clubs this has been a serious drawback, as it has tended to divide the members into two groups. The one favoring the sporting aspect of model flying has nearly always repudiated any intrusion of their belief.

The members of the scientific group are mostly drawn from those closely associated with full sized aeroplanes. To them there is no good in contests for distance and duration as they claim it leads to nowhere. The aviator accustomed as he is to view the Wright, Curtiss and other large aeroplanes, looks askance at the light model racer, differing entirely in design from the machines which he knows. He terms these flying sticks, toys, good enough for the play of boys, but not worthy of the attention of anyone seriously interested in aeronautics.

These arguments, gaining weight, have in the past, led to the holding of certain contests, restricting the use of a model below a given weight, say 8 or 10 oz. Both in England and this country, we frequently hear of these "scientific" contests. But are these contests any more scientific than any other. It seems to us that they are not. Thus we find model flyers appearing on the field of competition, with a standard type, hopelessly overloaded with what might best be termed "junk," an absurdity from an engineering standpoint; a most unscientific affair indeed, for which the builder deserves nothing else than the credit for apparently having spent a great deal of time and labor on it. It is no wonder that the flights of these "scientific" models in most cases are little else than short hops. These models more frequently than not, are designed according to the racing model type with propellers and main plane in the rear. The difference seems to consist in the number of useless pieces of bracing, guy wires and other things adding to the weight and resistance of the model, which are present. It is seldom that one finds a scale model which is accurate, especially in regard to distribution of weight; hence little is learned.

On the other hand, there is much to be said in favor of the light racer.

Perhaps the whole matter cannot be summed up than in a question once put the writer by a young model enthusiast, who in referring to distance and duration models said, "Why is it that they say these models are unscientific when they do the best work in the very thing that models are built for, i. e., to fly?" No, they are not unscientific. On the contrary, it is only because the fuselage has been constructed in the most scientific manner, care having been taken to put the bracing where it was needed; it is only because the wings are properly designed, neatly constructed, and resistance cut down wherever possible; because slow speed propellers are best, that the record holding models have been able to accomplish these results. A model must be most stable to circle about for more than two minutes, especially with the large wing surface of all good models to-day, a far more difficult feat with these low thrust *aeroplanes* than with many of the overpowered "scientific" *semi-helicopters.*

What is there of use in aeronautics that cannot be learned from models. It is the problem of engineering. The necessary size of the supporting beams of a 100 h.p. engine, and the proper way to attach the engine, the required strength of landing gear for a 1,000 lb., etc., all these very important things can never be learnt through models. This is not the less true because the model looks like its full size prototype. An experimenter may fly a model and find little or nothing of use to him, from an engineering standpoint, when he starts on a machine a thousand times as heavy.

It is in the great field of aerodynamics that the model flyer finds his efforts rewarded. Model aeroplanes afford an excellent opportunity for studying the distribution of weight in the Canard or loaded elevator type, for learning the difference between lifting and non-lifting tails in tractors, and other things pertaining to longitudinal stability. So too the effect of torque in single propeller machines, the action of dihedral angles, the use of vertical fins, flexible wings; all can be studied for the purpose of acquainting the aeronaut with the problems of lateral stability. Model flyers know the effect of pitch or thrust, and know how deceiving the standing thrust of a propeller is.

(To be concluded)

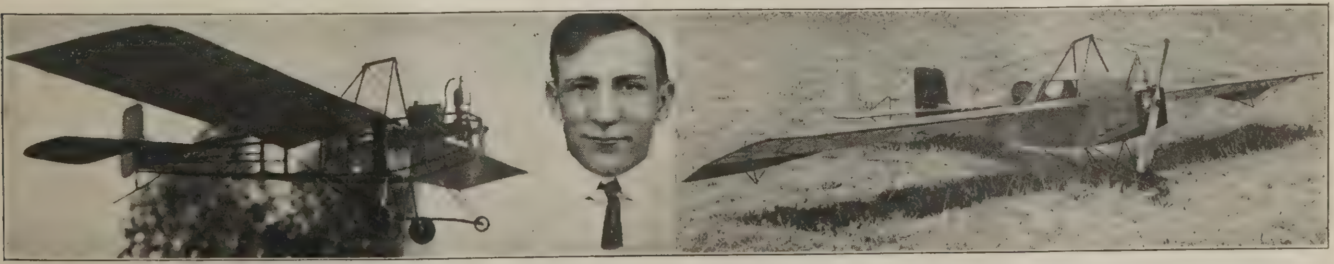
The Young Gasoline-Driven Model Monoplane

The model shown in the accompanying photographs was designed and constructed by Mr. Oscar Young while a student and member of the Aviation Section of the Signal Corps, stationed at San Diego, California.

After making a careful study in the construction and flying of model aircraft, Mr. Young designed and constructed one of the largest, most powerful and perhaps most scientific flying models of today. The model is of monoplane type and was designed along the finest of mechanical lines, the material used being of the best obtainable, some of it having been imported from England.

The dimensions of the model are as follows: Wing span, 9 feet 6 inches; chord, 2 feet; length, 5 feet 6 inches; height, 2 feet; the power plant consists of a gasoline engine of 3-4 h.p., which is capable of swinging a 22-inch propeller 2,700 r.p.m. The propeller weighs 2½ lbs. The machine complete weighs 12½ lbs.

The little monoplane has flown successfully, but owing to its value it has not been tested to the limit. In the very near future Mr. Young contemplates equipping the model with automatic stabilizer after whch it will be given a complete test.



On the left, Monoplane in flight, showing gasoline tank, engine and method of body construction. On the right, the Monoplane at rest, showing machine in completed condition. In center, Mr. Oscar Young, designer and constructor, who is now stationed at Mineola, Long Island.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

First Entries for Aeroplane Race

The following is a letter, announcing his entry in the Great Aeroplane Race, from Mr. Daniel V. Bowen, of New Haven, Connecticut. As it is of great interest, we reproduce it in full.

Aeronitis Editor.

Dear Sir—Enclosed please find my entry for "The Greatest Aeroplane Race Ever Held." Of course success is assured to this great event. The second prize is the object of my endeavor; not that I couldn't get the first prize, but the presence of such a cup as you describe would be strictly against my Prohibition principles (Unless, of course, it contained an exceptionally fine wine.)

I hope to have completed the construction of my special-built aeroplane in time for the race, and I believe that it would give great impetus to prospective entrants who lack confidence if I give a brief description of the wonderful biplane, with which I hope to enter and with which I will surely win.

This wonderful machine is, as before mentioned, a biplane double-end reversible, with two engines of tremendous power. Each of the wonderful engines has a piston displacement and develops 7 horsepower, so it is obvious that the plane in which they are fitted would be a radical departure from conventional practice.

This double-end, reversible feature is worthy of mention. It has a fusilage extending to the front and one to the rear. The two motors pull or push, with or against each other at the will of the pilot. The pilot's seat is mounted as is a piano stool, the idea being to quickly adjust his position according to the direction in which he chooses to drive. As soon as the pilot wishes to go in the opposite direction it is necessary only to throw in reverse. No need of turning the whole machine around, a crude method in vogue now. Of course the machine is to be inherently stable, but ailerons are stored in the fusilage lockers for emergency.

No fuel is carried because the machine does not have to be heated, as it gets there before the passengers have time to become chilled. (*How about cold feet?*—Ed.) Much to the contrary of our street car systems. Its tremendous speed can only be imagined. Recently one of these machines defeated, in a very spirited race, a very swift kite-balloon. So, barring the entry of any of the fast captive balloons which are so popular this winter in Alaska, the wonderful machine should easily out-distance any rival. Enclosed you may find my entrance fee of one thousand dollars. (I didn't.)

Yours confidentially,

I. M. Likely.

P.S.—My brother, whose skill and courage are nearly equal to my own, will probably pilot a second one of these machines, his aim being the first prize. He has built a bungalow and will remodel the cup into a steam heater.

I. M. L.

Our gratitude at receiving this entry was only exceeded by our disappointment at finding that Mr. Likely had forgotten to enclose his one thousand dollars. He will probably send it in the next letter he writes. (Very likely.)

We refuse his brother's entry, as we will have no one manhandle our cup, and he wishes to remodel it into a steam heater!

Our Own Little Dictionary

If others can get out a dictionary of aeronautical terms, there is no reason why we can't. The first batch of words follows:

1.	**Aerofoil:**	A refusal in mid air.
2.	**Head Resistance:**	An aviator's helmet.
3.	**Dope:**	Originally applied to anyone who flew: now applied to wings.
4.	**Side Slip:**	The family entrance.
5.	**Hot Air or Gas:**	Prospectus of a Newly Formed Company.
6.	**Drag:**	A state of being extremely friendly with those higher up.
7.	**Parasite Resistance:**	A refusal to lend money.
8.	**Lift:**	See *Elevator.*
9.	**Elevator:**	See *Lift.*
10.	**Blue Print:**	See *Hot Air.*
11.	**Stall, Stagger, and Spar:**	Pugilistic terms, wrongly used in aeronautics.
12.	**Stay:**	A device for stability of a body. (*Our modesty forbids us giving definition in detail*).
13.	**Stream Line Form:**	Obtained by the use of (12).
14.	**Capacity:**	Varies with the individual.
15.	**Soaring Machine:**	A cat-o-ninetails.

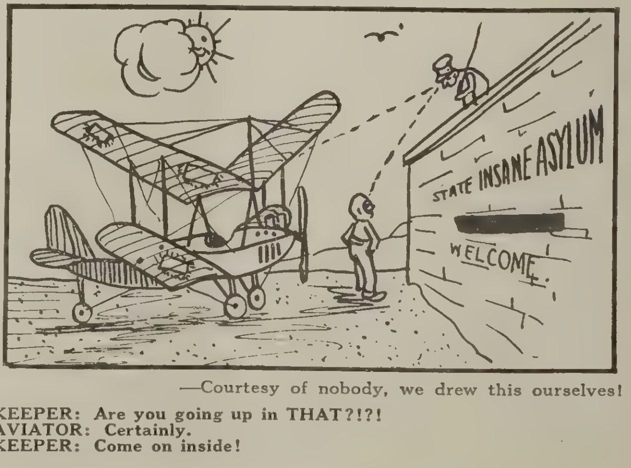
The following little story was told to us by Mr. Augustus Post of the Aero Club of America. He assures us that it is funny.

"When I was in the Astor Library the other day, an elderly gentleman approached me and asked me very courteously if I could tell him where he could find the waiting-room. 'Waiting-room,' I exclaimed, in surprise.

"'Why,' he queried, 'isn't this the Grand Central Station? I want to take a train to Albany.'

"'No,' I said, 'This is the New York Public Library. The only train you can take here is a train of thought—or a flight of imagination.'"

(*How about taking a few books, Mr. Post. They're all BOUND somewhere.*—Ed.)



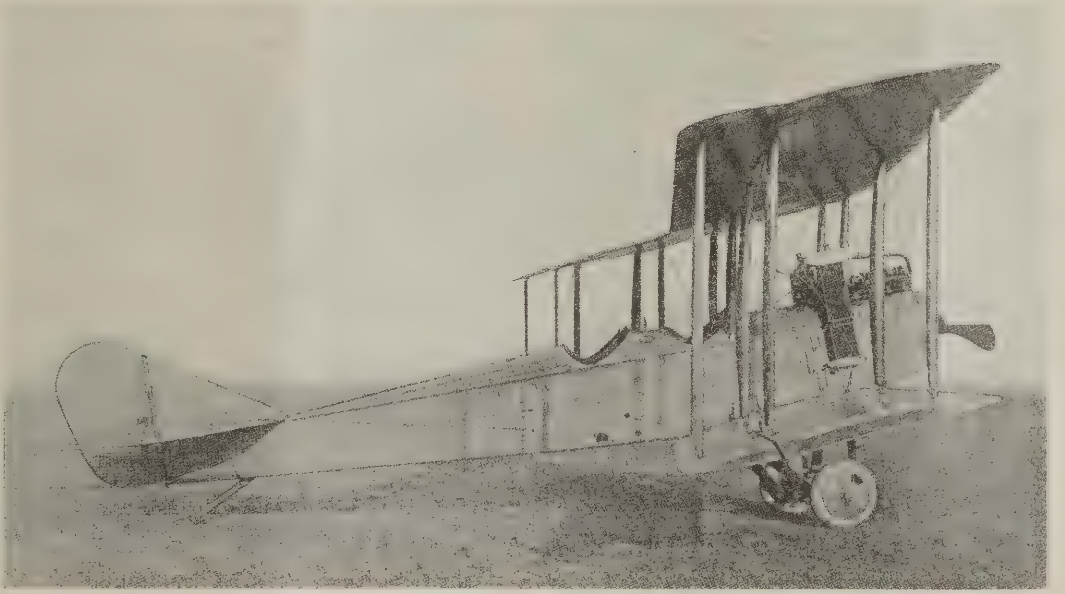
—Courtesy of nobody, we drew this ourselves!

KEEPER: Are you going up in THAT?!?!
AVIATOR: Certainly.
KEEPER: Come on inside!

STANDARD

AEROPLANES AND HYDROAEROPLANES

CHAS. H. DAY, *Designer*



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Army and Navy orders now being filled as the result of official inspection of factory and products

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Single and Twin Motored Types offered on the basis of results and not expectations

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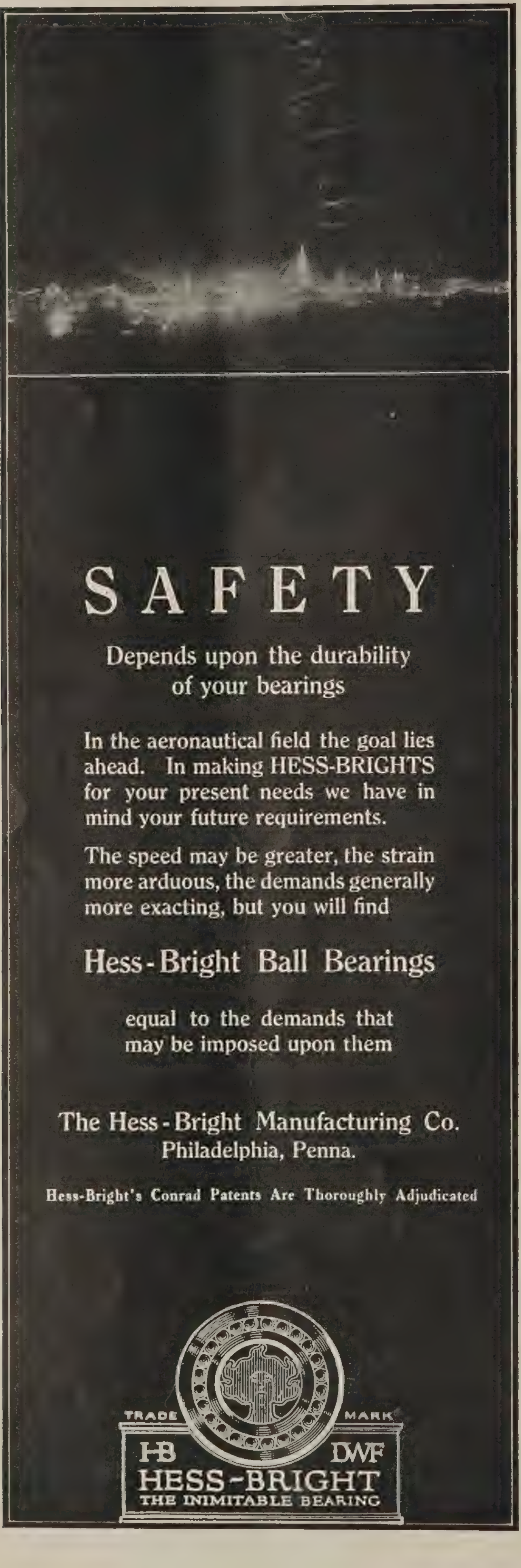

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Depends upon the durability of your bearings

In the aeronautical field the goal lies ahead. In making HESS-BRIGHTS for your present needs we have in mind your future requirements.

The speed may be greater, the strain more arduous, the demands generally more exacting, but you will find

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THE INIMITABLE BEARING

(*Continued from page* 329)

Prof. William F. Durand, occupying the chair of mechanical engineering in Leland Stanford, Jr. University, Stanford University, California; Prof. Joseph S. Ames, occupying the chair of mechanical engineering in Johns Hopkins University, Baltimore, Md.; Prof. Michael I. Pupin, occupying the chair of electrical engineering in Columbia University, New York City, and John F. Hayford, occupying the chair of mechanical engineering, in the Northwestern University, Evanston, Ill.

To strengthen and broaden the already strong and broad knowledge within this committee, other specialists have been appointed on subcommittees. For example, Professors W. J. Humphreys and W. R. Blair, of the Weather Bureau, have been given as aids to Prof. Marvin in the study of the relation of the atmosphere to aeronautics.

A subcommittee on motive power has been created, and at the head of this is Dr. S. W. Stratton, assisted by Captain Mark L. Bristol, U. S. Navy, and Lieutenant-Colonel George O. Squier, U. S. Army; and as aids, not members of the Advisory Committee, Lieutenant W. G. Childs, U. S. Navy, Dr. H. C. Dickinson, of the Bureau of Standards, and Mr. Henry Souther, of the War Department.

The activities of the Advisory Committee are controlled by its Executive Committee. This body of men has come to realize what a great problem is before this country if aviation is to be rapidly and sanely developed. The attention of the best industrial strength of the nation must be properly drawn to the importance of the art of aviation.

The Executive Committee has learned, through its many sources of information from abroad and from within the borders of the United States, that the problem is probably the greatest one that confronts any organization at this time. It believes that the use of aircraft will soon enter into the many services of the Government and also in many practical industrial fields.

In addition to war uses, it is inevitable that the Post Office will use aircraft for unusual service. It is not unlikely that the State Department will need the service of aircraft to carry important diplomatic despatches.

No one not in possession of much information on this subject can appreciate the prospect, and with this in view a committee has been selected to visit, as occasion offers, the commercially strong industrial centers of this country with the idea of conveying to them some of the problems and the possibilities of the air industry.

It is believed that by so doing, the industrial strength of the country will be aroused and will put its money and its best effort into the aircraft industry.

The advance made in aeroplane design and the knowledge already gained, which permits, by calculation, the prediction of the performance of an aeroplane in the air, has been very great. Just as it is possible to design a ship and predict its load carrying capacity, its speed, and its maneuvering power, so is it possible to design the load carrying capacity, the speed, the maneuvering power of an aeroplane.

The Government has been foresighted enough to send to technical institutions several young officers each year, and these officers are now active in Army or Navy service, designing and superintending the construction of advanced types of aircraft.

Similarly, the Government has been able to develop, since about 1910, a small body of very highly skilled aviators. These men have not only been trained to fight, but they are also trained in air navigation, in attack and defense methods as applied by aviators.

With appropriations now available, the increase in the number of trained aviators, trained in all phases of the art, will be rapid, and the teachers will be the small body of officers above referred to.

This training must be of the same thoroughness and quality as now exists at West Point and Annapolis.

The regular Army, the Reserve Corps, and the Militia, will all be drawn upon for men that will be turned into thoroughly skilled aviators—some of them skilled for army purposes, and some for navy.

The National Advisory Committee for Aeronautics is the body that can go to industry with the greatest strength behind it. It is the strength of the entire Government of the United States. This procedure is unprecedented.

The committee chosen to make such visits is as follows:

Dr. Charles D. Walcott, Secretary of Smithsonian Institute; Dr. S. W. Stratton, Director, Bureau of Standards; Lieut. Col. George O. Squier, Officer in Charge of Aviation; Joseph S. Ames, Mechanical Engineering, Johns Hopkins University, Baltimore, Md.; Prof. Charles F. Marvin, Chief of the Weather Bureau; Prof. Michael I. Pupin, Occupying Chair of Electrical Engineering, Columbia University, New York City; H. C. Richardson, Naval Constructor; Mark L. Bristol U, S. Navy; Henry Souther, Consulting Engineer, U. S. Army; Lieut. W. G. Childs, U. S. Navy, and Dr. H. C. Dickinson, Bureau of Standards.

The committee will have an opportunity to meet and confer with the heads of industry and will have an opportunity to inspect various plants that are equipped to make the very high grade motor now needed in connection with the art of aviation. The direct contact between properly commissioned Government officials, and just the right people in the industrial world can lead to but one result—increased interest and activity of manufacturers for all material connected with aviation. The motor, the accessories of the motor, the accessories used in connection with bomb dropping, photography, wireless communication, lighting as with searchlights, motor starters, and, in fact, the entire equipment of the air craft.

(*Continued from page* 332)

provided at sides of cockpit, having pockets for holding map boards, tools, goggles, gloves, etc.

Landing Chassis

Landing chassis of laminated ash, U shape. Two 26" x 5" wheels are sprung on a steel axle with streamline covering. Wheel tread 5' 10". A "pantagraph" shock absorbing system of unusual design is employed. The rubber is wound continuously and evenly about the fitting which binds the axle to the chassis members. At the bottom of the "U" chassis members, two streamline steel tubes are attached with fittings and eyebolts for the cross-bracing cables.

Tail skid, shock absorbing, with lower end metal shod.

Tail Group

The stabilizing plane is of the non-lifting type. It has an area of 32 sq. ft.

Elevators hinged to stabilizing plane in a semi-circular groove, into which the steel-tube leading-edge of elevators fit, leaving no gap between these surfaces. Elevators have a combined area of 23 sq. ft.

The triangular fin has an area of 5 sq. ft. Both the fin and the fuselage termination are grooved to receive the steel tube which forms the leading edge of the rudder. Area of rudder, 10 sq. ft.

Tail group braced by cable from the fin and from bottom of fuselage Shellac, varnish, coverings and dope applied as to the main planes.

Motor Group

Motor, Hall-Scott A-5, 135 H.P., having 6 vertical cylinders. Net weight of motor, 525 lbs. The exhaust is carried past the fuselage by two pipes attached to exhaust ports.

Propeller designed and constructed at the Standard factory especially for the "H-3" tractor. It is 9 feet in diameter, with a 5' 6" pitch. Blade 11 inches wide. Propeller driven at 1,250 revolutions per minute.

Radiator is supported on brackets above the motor, held by tubes running from the upper plane, which hold the radiator in a vertical position. Radiator 27" high, 6½" wide, 11" deep. A Moto-Meter thermometer is located so as to be easily read by the pilot.

The gas tank, located in front of passenger's seat, has a capacity of sixty-eight gallons. About three gallons of lubricating oil are carried.

(*Continued from page* 335)

Stabilizer, to Elmer A. Sperry and Lawrence B. Sperry for the Sperry Automatic Stabilizer, and to W. Sterling Burgess in recognition of his development of the inherently stable Burgess-Dunne Hydroaeroplane.

In installing the stabilizer on the Curtiss JN, the wing tips were cut off, leaving the ends at right angles to the leading edge.

The forward main wing spar is continued out past the wing tip by a steel tube, and to this the horizontal stabilizing vane is attached. This vane is 41 inches long at the forward edge, 50 inches at the trailing edge, with a uniform depth of 3 feet. A counter weight is attached by a steel plate extending 10 inches forward of the vane. This weight balanced the vane.

The vertical vane is situated 7 inches above the upper plane, carried on a 1⅛-inch streamline tube. The tube is 32 inches long, and at its lower end a streamline weight is suspended. The vane is 26 inches high and 28 inches deep.

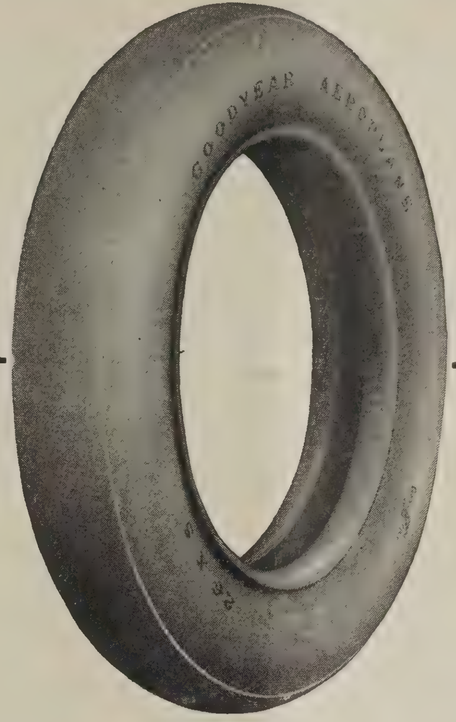
Vanes are built up on streamline formers, covered with veneer. The horizontal vane is 3½ inches in its greatest thickness. The two vanes are coupled by gears. When the vertical vane is caused to rotate so that the vane points outward, the gear connection causes the horizontal vane to point upward, causing lift according to the angle made by the vertical vane. The pair of vanes on the other wing-tip, of course, will work in the opposite direction, and as the vertical vane points inward, the horizontal vane is pointed downward.

(*Continued from page* 327)

ical College of Texas, Agricultural College of Utah, Norwich University, University of Vermont and State Agricultural College, Virginia Military Institute, Virginia Polytechnic Institute, State College of Washington, Marion Institute, the Harvard School, Hitchcock Military Academy, Mount Tamalpais Military Academy, St. John's College, Gonzaga College, Florida Military Academy, Marist College, Gordon Institute, Georgia Military Academy, Riverside Military Academy, Western Military Academy, Culver Military Institute, Kentucky Military Academy, Shattuck School, Gulf Coast Military Academy, Wentworth Military Academy, Kemper Military School, Missouri Military Academy, New Mexico Military Institute, Xavier High School, St. John's School, New York Military Academy, Bingham School, Columbia Military Academy, Bailey Military Institute, Sewanee Military Academy, Castle Heights School, West Texas Military Academy, Fork Union Military Academy, Northwestern Military and Naval Academy, San Diego Army and Navy Academy, The Morgan Park Academy, Wenonah Military Academy, Miami Military Institute, Blackstone Military Academy.

Among the enthusiastic expressions of appreciation received from the 50 universities to whom the Club offered medals of merit recently is a letter from Anson Phelps Stokes stating that the Prudential Committee of the Yale Corporation at its meeting on November 20th, adopted the following resolution:

"Voted, that the thanks of the University be extended to the Aero Club of America for its decision to offer medals to students of the University for essays on Military Aeronautics, Mechanics of the Aeroplane and Possible Application of Aircraft for Utilitarian Purposes."



Resilient and Light

In the shock of rough welcome by Mother Earth, it is good to know that Goodyear Cord Tires are under your 'plane.

The cord construction gives them resiliency and strength to withstand the terrific shock of landing on rough, uneven ground—and a factor of safety greater than that of any other aeroplane tire.

The light and very strong Goodyear Rims to which they are tightly attached, insure against slipping off, even when the landing shock flattens them out.

The reputation which extensive use has given them both here and abroad is not due merely to the fact they are the only *cord* tire made for air machines.

The superior workmanship and excellent materials have played no small part in the winning of their good name; just as they have established in favor everything made of rubber which Goodyear supplies for aeroplanes or balloons.

Send us your requirements.

The Goodyear Tire & Rubber Co.
Akron, Ohio

GOODYEAR
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WIRE

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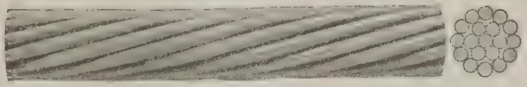

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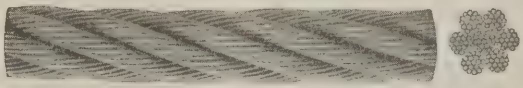

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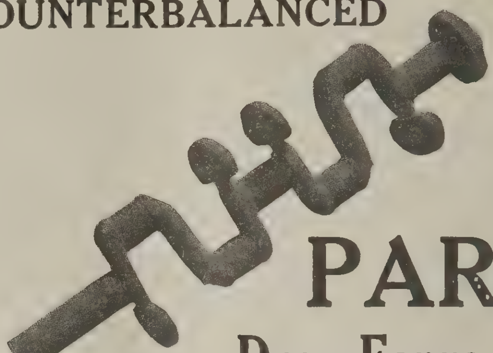

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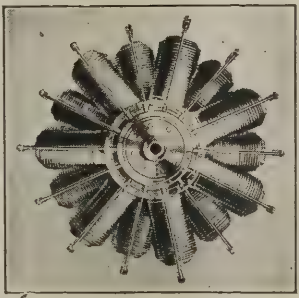

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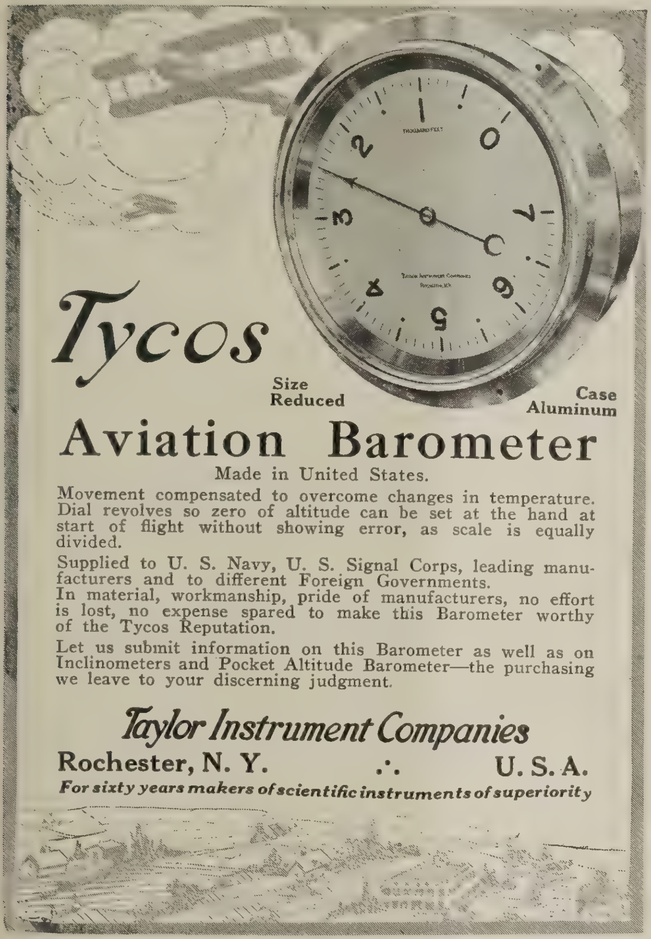
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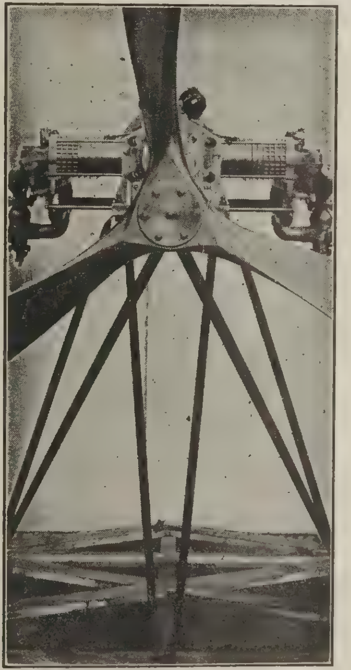

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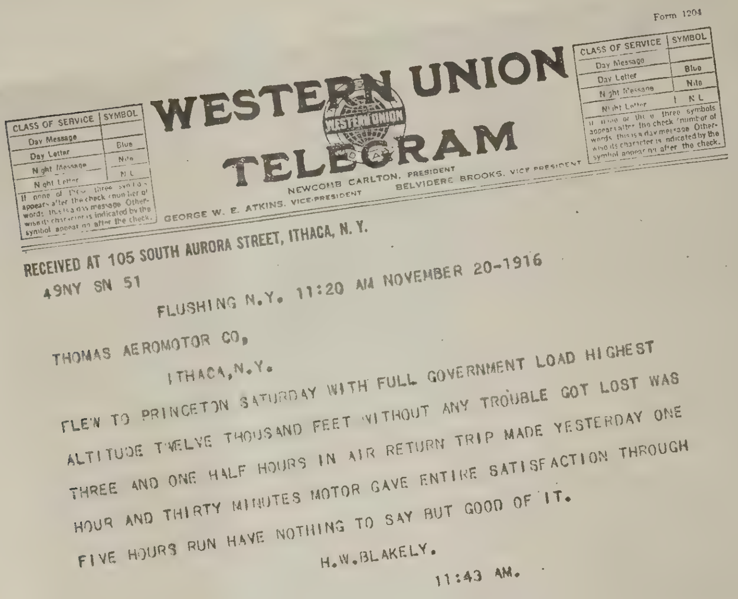

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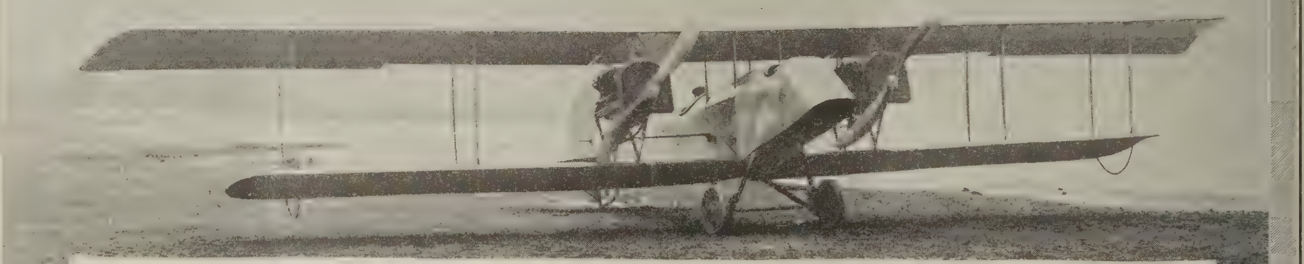

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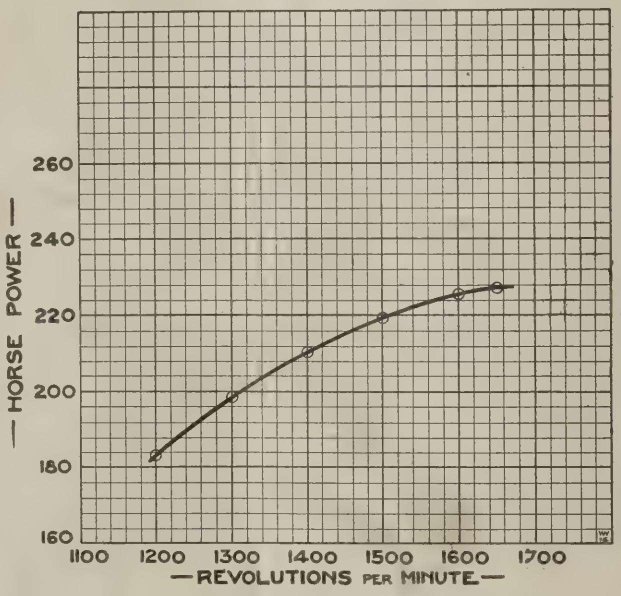

Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
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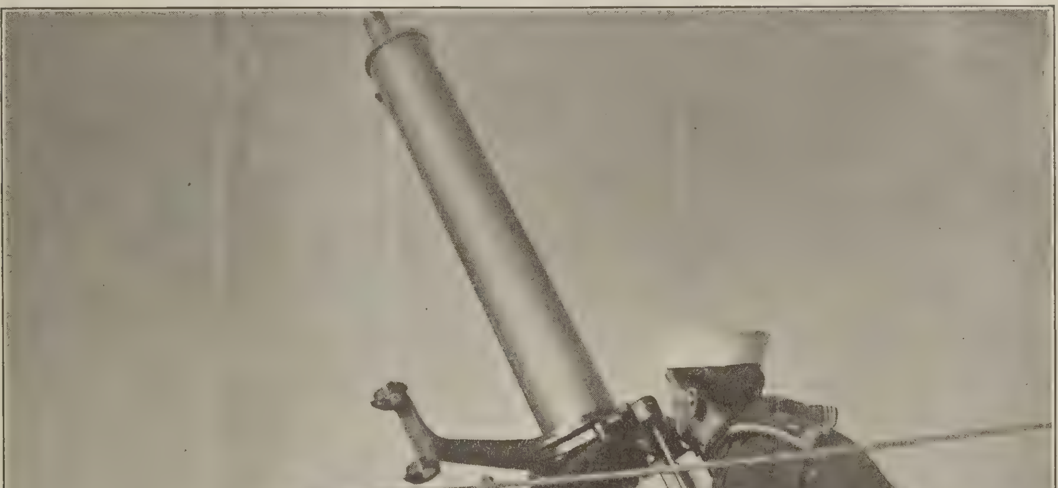

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> Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

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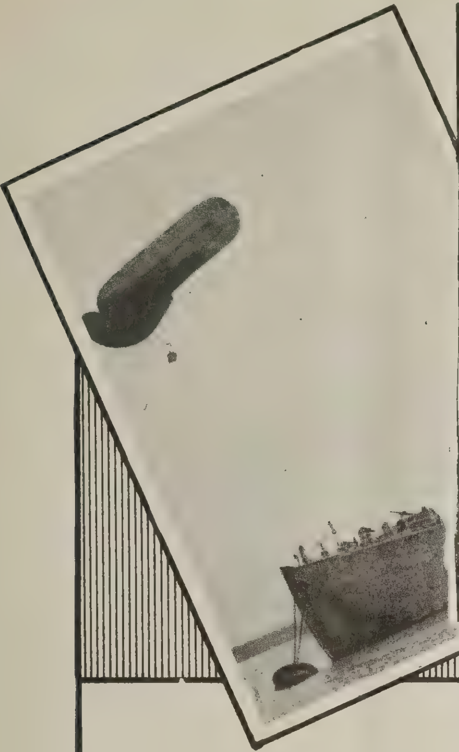

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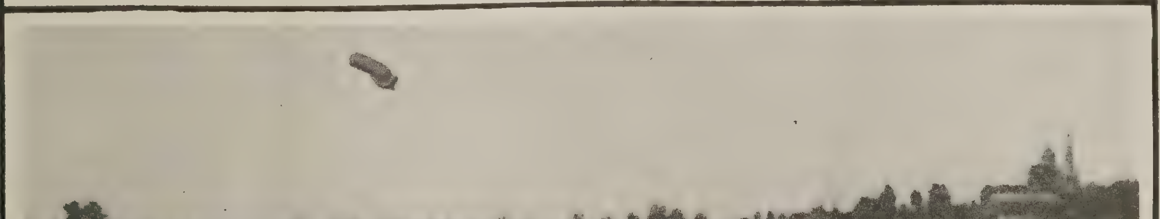

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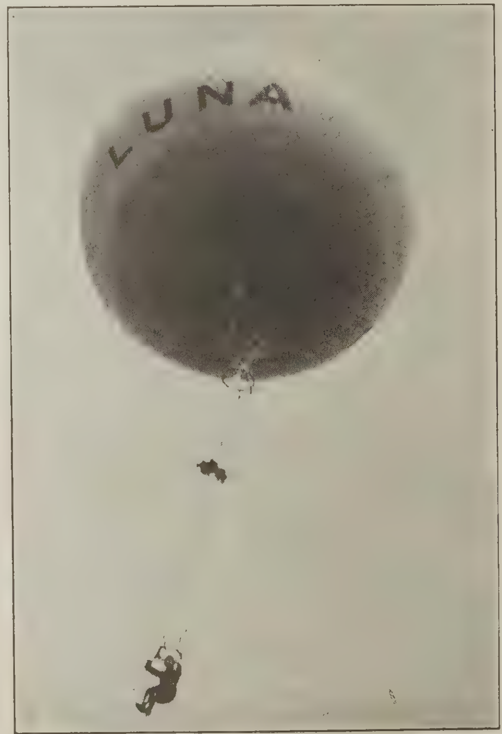

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Army to Get 24 Aero Squadrons and Aerostatic Units

THE Army is to get 24 Aero Squadrons and a number of aerostatic units. Secretary Baker's report shows that a substantial program has been outlined and distinct progress has been made.

Secretary Baker, in referring to progress in aviation, says: "The project for the development of the aviation section contemplates seven aero squadrons for the regular army, twelve squadrons for the National Guard divisions and five for the defences on both coasts, besides aerostatic units for the mobile army and coast artillery. The personnel for these will be made up from officers and enlisted men of the regular army, of the reserve corps and of the National Guard units."

Orders have been placed (or proposals solicited) for 419 aeroplanes, according to Mr. Baker's report. These machines include 91 reconnoissance biplanes, 120 advance training aeroplanes, 34 primary training aeroplanes, 13 pursuit aeroplanes, 155 reconnoissance hydroaeroplanes and 6 land combat aeroplanes.

The number of aerostatic units being planned is not given, but if the plans in this respect are as substantial as the aviation plans, the authorities are to be congratulated. The programme shows thorough appreciation of the country's needs.

The problem of getting suitable personnel is also being given due consideration. Incidentally, Mr. Baker's report points out that the authorized strength of the regular army on June 30, 1916, was 5,018 officers and 122,663 enlisted men, and the actual strength 4,843 officers and 97,013 enlisted men.

This shortage is most alarming, but the Aeronautic branch of the service is not likely to suffer as much as the other branches. Officials of the Aero Club of America are co-operating with Lieut. Col. George O. Squier, the officer in charge of this branch of the service, and they will soon present the plans of the aviation section to the students and graduates of hundreds of universities, from which there should come hundreds of candidates for the Aerial Reserve Corps.

Appropriation Asked for Aerial Mail Service

THE Post Office is to be complimented for its persistent efforts to start the aerial mail service. Since 1911 that department has been almost prophetic in its anticipation of developments in aeronautics. This year's report of the Postmaster General says:

"The remarkable development of the aeroplane has emphasized the purpose of the department to utilize it as an agency for the extension of the mail service wherever practicable.

"Advertisements were issued during the year inviting bids for aeroplane service on one route in Massachusetts and on several in Alaska. Inability of possible bidders to obtain specially constructed aeroplanes for the proposed aerial mail service rendered the efforts of the department, for the time, without results. However, negotiations with aeroplane manufacturers are still in progress. At the same time the department is co-operating fully with the National Advisory Committee for Aeronautics, looking to the establishment of a carefully conducted experimental aerial mail service.

"The department has also noted with interest the effort to transport mail from Chicago to New York by aeroplane.

"From published reports of aerial operations abroad it would appear that the dirigible balloon type of airship had been so perfected that it would convey great weight. In fact, the last statements that appear in connection with the subject assert that 300 passengers may be carried in an airship. This would approximate 15 tons net weight. The department is interested in determining the practicability with a view to its utilization. It is suggested that authorization be given for experiments to be made with this type of conveyor. For aerial experimentations an appropriation of $100,000 is recommended."

The Department is to be commended for its progressiveness.

Aeronautics in Secretary Daniels' Report

OWING mostly to the extreme shortage of officers and men in the Navy, the Navy Department was unable during the past year to make much progress in aeronautics. While the need of establishing an aeronautic station at every naval district is recognized, there has not been the personnel available to establish even one station in addition to the Pensacola station.

The report of Secretary Daniels, which was prepared in the early part of the summer, therefore contains remarks regarding the availability of large seaplanes which do not apply to the present status of American aeronautics, because large aeroplanes and motors can now be had. The section of the report relating to aeronautics follows:

"The necessity for aircraft as an important arm of naval service is appreciated now more than before their value was demonstrated in the European war. The development of aircraft in the Navy has not progressed as rapidly as its usefulness demands. There is no arm of the service which is now calling for more thought, for it is recognized that what has been done is but an earnest of the greater things which must be done to strengthen the flying corps and make it as effective as the Navy is afloat. Efforts are making to secure the fullest co-operation with the Army Aviation Corps and the civilian efforts to improve the service. The aviation base at Pensacola, which site was selected by a board of able naval officers, is rapidly being equipped. Cruisers are being fitted with catapults. Suitable craft are being obtained as rapidly as American manufacturers can supply them.

"The greatest difficulty in connection with naval aeronautics is due to the fact that practically every American aeroplane manufacturer is primarily a builder of land machines, and has not considered the special problems of naval aeroplanes. A land aeroplane cannot be modified into a successful naval aeroplane for many very apparent reasons, yet manufacturers continue to endeavor to build naval aeroplanes by such methods. Furthermore, most of the manufacturers have little first-hand knowledge of sea conditions, and their floats and structure do not stand up under such conditions. Until they learn exactly what is required there will necessarily be a great many failures and rejections, and hence the progress depends almost directly on the education of manufacturers in this work. There are reasons to believe, now that the last session of Congress has appropriated enough money to justify investment, that manufacturers will construct aircraft for naval purposes. Great trouble has been and is still experienced in obtaining suitable aeroplanes and engines.

"There are now seventeen aeroplanes in active use by the Navy. There are on order sixty machines of various types which have not yet been completed and accepted. The industry is still so new that standardization of manufacturing method has not yet been reached, any many delays and rejections are inevitable. Some companies have made progress, however, and the situation is improving. A large twin-engine aeroplane has been designed and built at the Washington Navy Yard and is undergoing tests. It is proposed both to buy from private manufacturers and to construct at Washington suitable aircraft. Efforts have been made to procure such craft from European nations where the exigencies of war have stimulated talent and manufacture. The war has prevented this in large measure. One Paul Schmidt machine, equipped with new type of Renault engine, has been shipped from France. Two Farman aeroplanes have been ordered from that country. Two Green engines have been recently obtained from England. Great difficulty, however, is experienced in obtaining aeronautic supplies from Europe at present. The construction of rigid airships will soon be commenced; plans are being drawn for non-rigid vidette type airships.

Other types have been purchased or ordered and will be supplied as rapidly as possible. The appropriation of $3,500,000 by the first session of the Sixty-fourth Congress has enabled the department to begin on a larger scale. Increased appropriations are necessary to make the aircraft arm of the Navy what it must be to render the service which experience has shown these ships of the skies are capable of rendering in time of war. Surprises in war ended with the coming of the scouts of the air. The European war has taught us many things in connection with aeronautics. Foremost among these lessons are the necessity for a large trained personnel. The flying services in those countries, though in most cases small, were well trained and fairly well equipped at the outbreak of the war, but the sudden expansion which became necessary almost completely broke down the organization, because there were not enough trained officers and men to man the machines in the field and afloat, and at the same time conduct the administration of the services and the training of new personnel on shore.

"The first session of the Sixty-fourth Congress authorized the admission of civilians into the Naval Flying Corps. Some of the most expert aviators in Europe are young men who have the requisite quality of skill and daring needed as scouts of the air. They were neither Navy or Army officers. This country is now to utilize men of this gift in its Naval Flying Corps, in addition to the classes of educated and trained officers who go into this branch of the service. This training is now being extended to officers and men of the Naval Militia and the Coast Guard. There are at present at the Pensacola Aviation Station nine officers qualified as naval aviators and sixteen officers under instruction. A new class consisting of twelve naval officers, eighty men, four marine officers and sixteen men, four Naval Militia officers and sixteen men and two Coast Guard officers and eight men is now about to be sent to the station. There are now also two marine officers receiving instruction in land machine flying at the Army School at San Diego, Cal. Qualified officers for aeronautic work at sea from ships and for inspection duty on shore are continually required, and this demand is continually increasing. The supply of officers to be trained must be maintained and the rate of supply must be increased to meet the increasing demand.

"A joint Army and Navy Board will shortly convene to decide upon the division of responsibility between these services for the air forces of the nation. Immediately upon the settlement of this vital question the subject of coastal air stations for patrol and defense will be taken up. Plans have already been drawn up by the Navy, but a complete understanding between the two services is being sought before steps can be taken to put such plans into effect. The Advisory Committee for Aeronautics, authorized under and appropriated for in the Naval bill, is working in hearty co-operation with the aviation corps of both the Army and Navy, and it is hoped and believed this spirit of co-operation and the results of the study of this scientific body and Naval Consulting Board will aid in a more rapidly increasing and efficient aviation branch of the service."

General Board Recommends $6,000,000 for Naval Aeronautics

The report of the General Board is as follows:

"Aeronautics in the Navy has not apparently advanced to any great extent and its progress has not been satisfactory. Undoubtedly much preliminary work has been done experimentally which does not show, and much of the routine of training of personnel and of overhaul of aircraft has been systematized; but the application of this very important branch of the service to the practical uses of the fleet has not yet been fully developed. Satisfactory aircraft do not appear as yet to be available for use with the fleet.

"An aeroplane, in itself, is a very small craft, but the type necessary for the service has not been fully developed. This is probably due to several causes, and the General Board is of the opinion that the necessary directive effort can best be obtained by, and it therefore recommends the establishment of an office whose head should be directly responsible for co-ordination in the work of construction and general development. Such an office should be under the direct control of the Chief of Operations, as is the office of mines and mining.

"The General Board invites attention to its letter No. 449, of June 24, 1916, regarding the use of lighter-than-air machines in connection with the work of the fleet, and renews the recommendations therein made. Reports from abroad seem to show their value for scouting and spotting purposes, and also show the great difficulty which both England and France have experienced in developing a satisfactory type. The General Board, therefore, recommends that sufficient appropriation be requested to provide for the construction and development of aircraft of this type.

"The General Board recommends that at the earliest practicable date the fleet be furnished with aviators and aircraft in adequate numbers, and it further recommends that $6,000,000 be appropriated in the 1918 program for naval aeronautics.

"The General Board also invites the attention of the department to the advisability of developing detail coast charts for the use of aviators, such as are now in use abroad, to aid them in recognizing the locality in which they are operating."

Report of Chief of Naval Operations

The report of the Chief of Naval Operations follows:

"The development of naval aeronautics has continued to receive the department's serious attention, and though progress has not been rapid, the difficulties have been met without discouragement, and it is hoped that a type of naval aeroplane adapted for use over the sea, and its use from shipboard, are now problems near solution.

"It must not be forgotten that all the wonderful advance in the science of aeronautics has been almost wholly along the lines of service over land, and that the service over sea is a new field, involving many unsolved problems widely different from those which have been solved in the land service. The naval aeroplane has its home on a ship, from which it must learn to take its flight and to which it must return to be reclaimed undamaged. The naval aeroplane has no smooth meadow from which to rise and upon which it may alight. It starts from the heaving deck of the scout and may have to rest, on its return, upon the surface of a stormy sea. Difficulties in the design of motors, of propellers, and of landing floats have been encountered and are steadily being overcome, the solution of these problems being greatly aided by the testing laboratory established at the Washington Navy Yard.

"An aeroplane constructed after the department's own design is now nearly completed and is expected to solve many of our difficulties and establish the standard type for future construction.

"One of our armored cruisers, the North Carolina, has been fitted with a practical aeroplane launching device and, supplied with a number of naval aeroplanes has joined the fleet to co-operate in fleet work and to develop the tactics of aircraft on the sea. The West Virginia and Washington, sister ships of the North Carolina, have similar equipment installed, and other armored cruisers and scouts will, when opportunity offers to do the work, be fitted in like manner."

Naval Aviation Training Camps Advocated

NAVAL aviation training camps to be conducted under the direction of the navy, to train the hundreds of would-be aviators who are anxious to learn to fly for the safety of their country, we advocated at the Navy Department yesterday by officers of the National Aerial Coast Patrol Commission and the Aero Club of America, in a meeting called by Secretary Daniels and presided over by Assistant Secretary Roosevelt.

Assistant Secretary of the Treasury Byron R. Newton, Assistant Secretary of War William H. Ingraham, Congressman Murray Hulbert of New York, Mr. E. Lester Jones, superintendent of the U. S. Coast and Geodetic Survey; Dr. H. C. Frankenfield, chief forecaster of the U. S. Weather Bureau, and Earl Hamilton Smith, Washington representative of the Aero Club of America and the Conference Committee on National Preparedness, attended the meeting in behalf of the National Aerial Coast Patrol Commission.

Henry Woodhouse, Raymond B. Price, vice-president of the United States Rubber Company, and Godfrey Lowell Cabot, president of the Aero Club of New England, represented the board of governors of the Aero Club of America.

F. Trubee Davison, son of H. P. Davison of J. P. Morgan & Co., and A. L. Gates of Iowa took a prominent part in the discussion. They are members of the Yale aeronautical unit which organized the first New York section of the National Aerial Coast Patrol, which has twelve flyers, all of Yale, and four flying boats. The members have contributed $75,000 to aeronautics.

The purpose of the meeting was to lay plans for a co-ordination of the naval auxiliary reserve, including aeroplane units, power boat squadrons and naval reserve contingents.

A delegation came down from New York in behalf of the Power Craft Association, of which the moving spirits are Ralph Pulitzer and John Hays Hammond, Jr.

The delegation from the Naval Training Association of the United States was composed of John L. Saltonstall of Boston, William Greenough and Charles Longstreet Poor of New York, and Thomas Newhall of Philadelphia.

Important recommendations for naval auxiliary work next summer were suggested in regard to power craft and naval reserves. They were taken under advisement, but no announcements as to definite plans can be made until Mr. Roosevelt gives them out.

With Assistant Secretary Roosevelt at the meeting were Rear Admiral Benson, chief of the Bureau of Operations; Rear Admiral Baker, chief of the Bureau of Navigation; Captains Hood, Chase, Marble and McGruder, and Lieut. Commanders Galbraith and Towers.

The Pan-American Aeronautic Exposition

THE first Pan-American aeronautic exposition, to be held in Grand Central Palace February 8 to 15, will be considerably more than a mere display of aircraft. One of the ideas of the show is to make it a permanent institution for the development of aeronautics in connection with national preparedness, and to this end numerous prizes are to be awarded.

A further step is to develop Pan-American aeronautics and to interest students of the Pan-American republics in this subject, and with this in mind the Aero Club of America announces that it will offer three gold medals of merit to each of a number of universities of the twenty South American republics of the Pan-American Union. A letter has been written to each of the ambassadors of these republics advising them of the offer, and these in turn will transfer them to their own institutions. The three medals of merit are to be awarded during the aero show to the three students in each institution who write the best essays on (1) military aeronautics, (2) mechanics of the aeroplane and its technical development in aeronautics, (3) possible application of aircraft for utilitarian purposes.

Alberto Santos-Dumont has very aptly stated that "the aeroplane will knit the States of the Western Hemisphere into an integrally united, co-operating and friendly combination allied for well-being in sport, trade and commerce, as well as for strength in time of peace and war."

Coming at a time when the eyes of the entire world are focused upon aviation, because of the fact that the campaigns on each of the war fronts are vitally dependent upon the aero-

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THE NEWS OF THE WEEK

Orville Wright Perfecting Stabilizer

The aeroplane made as safe as the automobile—that is the dream of Orville Wright, who, with his brother Wilbur, now dead, gave man dominion over the air a decade ago. That dream is said to have become a reality with his new stabilizer, for which patents are to be applied for within a few weeks.

Never prone to talk much, Orville Wright is even more reticent than usual on the topic of his latest invention. With patents not obtained, naturally he will not divulge secrets until it is assured that he will reap the rewards of the service. On the question of what it will do, however, he is not so secretive. He believes aircraft will be as safely and easily piloted as the most humble "flivver."

His new stabilizer enters the domain of electricity. By a unique arrangement of batteries, augmented by a pendulum swinging in a liquid bath and a minor propeller placed almost directly over the pilot's head, absolute, unswerving, automatic stability is said to be maintained.

Weather conditions of early November were excellent for flying and while Aviator Victor Carlstrom was driving his big 200 horsepower machine. The stabilizer gave me a perfect inventor of the first heavier-than-air flying machine, was perfecting his invention in a series of flights on the aviation field east of Dayton.

For the first time in more than three years Mr. Wright made an aerial flight. Almost daily for a period of two weeks he made flights and continued tests.

It was following the end of one of these flights that he exclaimed: "I'm more than satisfied with its work now. All I had to do was to steer the machine. The stabilizer gave me a perfect balance during the entire flight. It did all the 'banking' on the turns and righted the machine on every dip."

Dinner to Miss Law

A dinner complimentary to Miss Ruth Bancroft Law in recognition of her achievement in making the longest non-stop flight of any aviator in America and the second longest flight in the world will be given on Monday evening, December 18, at 8 o'clock at the Astor Hotel, under the joint auspices of the Civic Forum and the Aero Club of America.

Rear Admiral Robert E. Peary, U. S. N., retired, will preside, and Captain Roald Amundsen will be a guest of honor and speak. Among the other guests are to be Victor Carlstrom, Murray Hulbert, Major Carl F. Hartmann, of the United States Signal Corps; Mrs. Douglas Robinson, Mr. and Mrs. Henry P. Davison, Beatrice Forbes-Robertson, Eleanor Gates, Alan R. Hawley, Henry Woodhouse, Henry A. Wise-Wood and Evert Jansen Wendell.

The committee in charge of the dinner regard it as a fortunate circumstance that the discoverers of the North and South poles can both be present and unites in praising the skill and courage of Miss Law. Miss Law will receive a suitable token of appreciation for her unusual aerial feat.

Army and Navy Orders

First Lt. Joseph C. Morrow, Jr., aviation officer, Sig. Corps, to Memphis, for temporary duty in connection with aeronautics of army, and on completion return to Chicago.

First Lt. Harvey B. S. Burwell, 13th Cavalry, attached to aviation section, Sig. Corps, as aviation student, to Sig. Corps aviation school, San Diego.

Capt. Charles S. Hamilton, 11th Infantry, to Ft. Sam Houston, for examination for detail in aviation section, Sig. Corps.

First Lt. Henry W. Harms, aviation officer, Sig. Corps, on completion of duty at Ithaca, N. Y., to Buffalo, for temporary duty in connection with aeronautics, thence to proper station.

Naval Con. H. C. Richardson, detached navy yard, Washington, Dec. 14; to naval aeronautic station, Pensacola.

First Lt. Arthur G. Coumbe, Med. Res. Corps, to Sig. Corps aviation station, Mineola, L. I.

William B. Stout with Packard Co.

William B. Stout, general sales and advertising manager of the Scripps-Booth Corporation, Detroit, has been appointed manager of the aircraft division of the Packard Motor Car Company. W. I. Brown, who has been assistant sales manager, will succeed Mr. Stout.

Vermont Aero Club Holds First Annual Meeting

The first annual meeting of the Aero Club of Vermont, which was organized at Camp Governor Gates, July 6, 1916, was held in the Hotel Vermont, November 27, and was attended by about 70, including members of the club and invited guests, 14 places in the State being represented. When the business meeting had been adjourned, during which meeting the officers elected at the time of organization were re-elected, James Hartness, of Springfield, president of the association, rose as toastmaster to introduce several speakers who held the undivided interest of their listeners as they talked on aeronautics. The meeting was one of the most enthusiastic which has been held in that city for some time and there is no doubt but that the club will accomplish results in Vermont along pioneer lines in aeronautics.

The officers re-elected at the business meeting were as follows: President, James Hartness, of Springfield; vice-president, Adjutant-General Lee S. Tillotson, of St. Albans; treasurer, Herbert R. Roberts, of Northfield; secretary, James P. Taylor, of Burlington; members of governing board, Governor Charles W. Gates, of Franklin, Major Wallace Batchelder, of Bethel, Governor-elect Horace F. Graham, of Craftsbury, Adjutant-General Lee S. Tillotson, of Montpelier, Col. Ira L. Reeves, of Northfield, W. T. Scofield, of Burlington, Redfield Proctor, of Proctor, Clarke C. Fitts, of Brattleboro, and the president and secretary.

Norman Prince's New Aeroplane to be Exhibited in Boston

Bostonians will have a chance to inspect the aeroplane in which Norman Prince met his death in France. The French War Department, through its representatives in this country, has promised to send the machine to this city to be exhibited at the National Allied Bazaar in Mechanics Building, Dec. 9 to 20.

Don McGee with Fenton Aviation School

Fenton's aviation school has secured the services of Don McGee of Saginaw, for the next few weeks to assist Albert Boshek with his large class of students. Mr. McGee is the young aviator who made a flight last week from Ann Arbor to Saginaw, accompanied by Miss Esther Lamb, of Flint.

The Barlow bomb, which has been tested recently at the U. S. Army Aviation Field at Mineola.

Field Officers to Learn Flying

The field officers' avaition school at San Diego has been opened and the following officers form the first class: Colonel William Kenly, Sixth Field Artillery; Lieutenant Colonel George Bishop, Eighth Field Artillery, and Majors Brooke Payne, Sixth Field Artillery; J. B. Bennett, Eleventh Infantry; William Burnside, Field Artillery, and W. C. Harbison, Coast Artillery.

The course of instruction will cover a period of six weeks, during which the field officers will be taught the working of the aeronautical academy and given an insight into the tactical use of aeroplane squadrons with mobile bodies of troops and artillery. A second class will be formed January 1.

Eighteen aeroplanes, including two 200 horsepower machines, two triplanes and fourteen reconnaissance machines are due to arrive next month.

Army Orders 96 Hydroaeroplanes

Contracts for ninety-six twin motored hydroaeroplanes were awarded December 8 by the aviation section of the signal corps of the United States Army. They are to cost $2,007,000.

The orders for hydroaeroplanes were awarded as follows: Standard Aero Corporation, of Plainfield, N. J., thirty-two machines; Burgess Company, of Marblehead, Mass., thirty-two; Curtiss Company, of Buffalo, sixteen; Aero-Marine Sales and Engineering Company, of New York, sixteen.

It is proposed to use the boats for coast defenses of the United States, the Philippines, Hawaii and the Panama Canal. For use in connection with them there have been ordered many "sea sleds"—very sturdy power boats with a speed of forty-two miles an hour. They ar kept at the base and sent to the aircraft in cas of trouble.

U. S. Aviators Make Two New Records in Radi Sending

Captain C. C. Culver, of the Army Aviation Signal Corps, holds the world's record for long distance sending of wireless messages from an aeroplane while in flight. The War Department announced that in recent trials on the Pacific Coast Captain Culver sent and received messages 119 miles. The previous record is believed to have been forty-eight miles, recently established by a French aviator.

In later trials Captain Culver made the first known successful attempt to send a wireless message to another aviator in flight. The message was received by Lieutenant William A. Robert on, of the San Diego Aviation Training School, while flying in a machine piloted by A. D. Smith. Messages were transmitted while the machines were more than two miles apart and at an altitude of approximately 1,000 feet.

Burgess News

An order of thirty-two hydroaeroplanes has been received by the Burgess Co. here.

These machines will be the two motored tractor type and will have a wing span of more than seventy feet with an over-all length of between thirty and thirty-three feet. The machine empty will weigh narly two tons and the load carried will be 1,500 pounds.

The motor power will be supplied by two Hall-Scott motors of 125 h.p. each, giving a maximum speed of seventy-five miles an hour. The design also calls for a minimum speed of forty-five miles an hour and a climbing rate of 250 feet a minute with full load aboard. Seats for pilot and observer are provided in the central body which extends back and carrying on its after end the fixed tail surface and the horizontal and vertical rudders.

This order is part of the new equipment to be secured by the U. S. Army and the aircraft will be completed at the earliest possible moment.

The machine will be mounted on two floats placed beneath a center section, thus giving special stability while on the surface of the water.

Despite unfavorable weather, work at the Burgess school has been going on rapidly with five pupils recently made ready for taking out their certificates. These include R. F. Korman, Ector Orr Munn, K. Merrick, Norman Cabot and J. R. Richmond. Other pupils who are progressing rapidly at the school are Ralph Pulitzer and S. P. Mandell, both Harvard students.

Katherine Stinson to Attempt Transcontinental Trip

Prior to leaving San Francisco for Japan and China, Miss Katherine Stinson stated that she had placed an order with the Christofferson Aircraft Co. for a special machine in which she hopes to make a transcontinental trip in the Spring.

Indian Motorcycles Ordered by War Department

The War Department has placed an order for fourteen Indian motorcycles, to be delivered on December 7. This order was placed with the Hendee Manufacturing Company, of Springfield, Mass., as the result of competitive bids filed with the Quartermaster's Department in New York City by several manufacturers of motorcycles.

The machines are to be used as an auxiliary arm of the aviation corps. Their chief duties will be rushing supplies from point to point for the aviators, and it is expected they will also prove valuable for the purpose of rushing mechanics to points where aeroplanes may have come to grief or have been forced to descend because of engine trouble.

The fourteen Indians ordered are to be of 1917 three-speed, electrically equipped model, equipped with cradle spring frames and Splitdorf mag-dynamos. Each machine will also be equipped with a side car. Their color will be of olive drab, but slightly different in shade from the coloring of other army machines. They will be lettered with the aviation corps insignia.

The first licensed Hawaiian, S. Y. Young, who graduated at the Curtiss School.

Capt. W. G. Kilner Married

An aeronautical romance culminated in New York the other day when Captain Walter Glenn Kilner, U. S. A., one of the best military aviators in the country, was married to Miss Grace Covel in the Church of the Transfiguration.

Announcement of the marriage will come as a surprise to the many relatives and friends of the couple, although their engagement had existed for some time.

Last spring early the captain was sent to the border, where he distinguished himself in aviation. About three months ago he was placed in charge of the aviation station at Hempstead Plains, on Long Island.

He came into prominence last March when he and other Army aviators were reported lost in Mexico. He returned safely to United States soil, however, and explained his absence as due to engine trouble. Last month he flew from Mineola to the Yale-Princeton game in an aeroplane.

Plan Metric Conference

A National Metric Conference will be held in New York during the last week of this month, at which representatives of commercial and scientific organizations will discuss the most effective means of obtaining the adoption of the metric system of weights and measures by the United States.

Among the organizations interested in the conference are the National Wholesale Grocers' Association, American Institute of Mining Engineers, American Pharmaceutical Association, American Institute of Electrical Engineers, American Institute of Civil Engineers, American Chemical Society, National Wholesale Druggists' Association, National Association of Food and Dairy Officials, National Association of Retail Druggists, American Institute of Chemical Engineers and the Aero Club of America.

Two Airmen Here to Plan Trans-Atlantic Flight

Lieut. Kjell Nyegaard, of the French Flying Corps, and Capt. Hugo Sundstedt, the famous Swedish flyer, arrived in New York from France recently, bent on making a transatlantic flight in an aeroplane next spring.

Nyegaard is one of the well known French Army birdmen.

Capt. Sundstedt is the Chief Pilot aviator of the Swedish Navy, and he flew from Paris to Stockholm in nineteen hours in July, 1914, stopping only at Bremen. Before that he had flown from Paris to Hendon, England, and back in a Henri Farman biplane with a passenger, for which the French Aero Club gave him a gold plate.

The aviators will have a machine built here this winter large enough for four passengers, as a mechanician will be taken along. They plan to start at Newfoundland and make the Irish coast in twenty hours. Both are bubbling over with confidence in their project. Their craft will be larger than the America type. They will consult with Glenn H. Curtiss in a few days.

In the meantime Nyegaard may bring from France a 110 horsepower Ponier biplane in which he has repeatedly flown 200 kilometers an hour. These little craft, none of which has been seen here, have a swing spread of only 5.18 meters. They are now used by the French flyers for fast scouting duty.

Drawback Granted on Aeroplane Exports

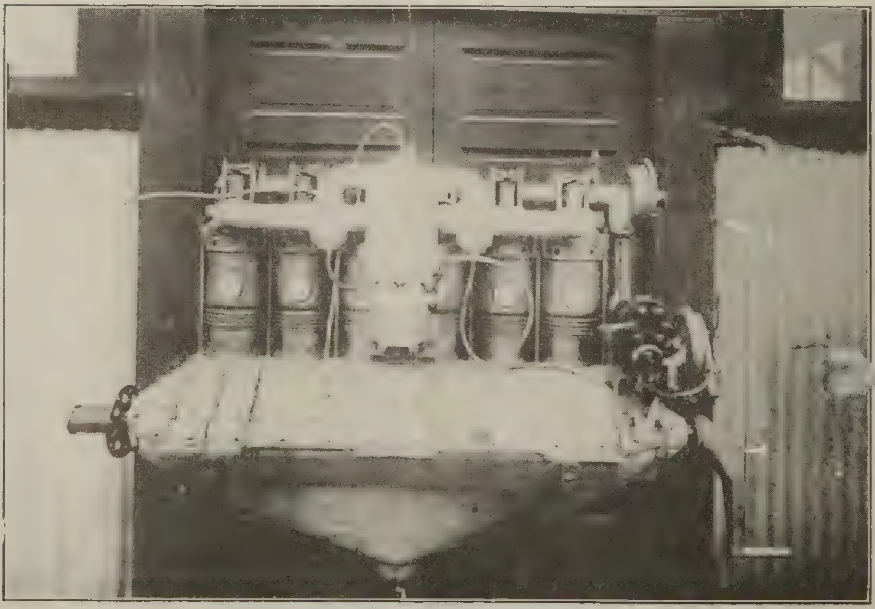
A drawback allowance on the exportation of aeroplanes manufactured by the Curtiss Aeroplane Company, of Buffalo, N. Y., with the use of imported sheet aluminum, linen and ball bearings, was granted by the Treasury Department. This is the first drawback of this nature granted by the Treasury.

It was stipulated that drawbacks may be allowed under these regulations on flying machines exported on and after December 21, 1915. Supplemental sworn schedules covering other styles of flying machines may be filed and upon verification of such supplemental schedules drawback may be allowed on flying machines manufactured in accordance therewith.

Herbert Chase Joins Office Staff of Society of Automobile Engineers

Herbert Chase, who has been connected with the Automobile Club of America for several years as laboratory engineer and chief engineer, has joined the office staff of the Society of Automobile Engineers in the capacity of assistant secretary. Mr. Chase is treasurer of the Society and a member of its Council. He has taken a prominent part in the activities and conduct of the Metropolitan Section of the Society since its organization. He has made numerous contributions of engineering value on tests and testing of motor car engines of the internal combustion type and on the possible uses of cycles other than that of the Otto engine. Mr. Chase's long service on the Publication Committee of the Society will enable him to assume readily editorial work on the Bulletin and other publications of the S. A. E.

Mr. Chase's preparatory engineering education was had at Pratt Institute. He was graduated as a mechanical engineer at Sibley College, Cornell University, in 1908.



The new model Hall-Scott aero engine, the weight of which has been considerably reduced by the use of new type cylinders.

Dr. C. D. Walcott Recommends Construction of Dirigibles

Armored dirigibles similar to Germany's Zeppelins must be developed by the United States military forces along with battle aeroplanes, if this country is to be properly prepared against the ravages of war. This is the recommendation of Dr. Charles D. Walcott, secretary of the Smithsonian Institution and chairman of the National Advisory Committee for Aeronautics of the Navy Department. He gave this opinion as the result of his careful stdy of modern conditions of warfare in response to inquiries by members of the House Committee on Naval Affairs, before which he appeared as a witness.

A few minutes after Dr. Walcott had finished his testimony the committee learned from Henry Souther, consulting engineer of the Army Aviation Corps, that samples of the fabrics of German Zeppelins which have fallen on British soil are now in possession of the American Army authorities and are being studied by experts, with a view to duplication of these airships on this side of the Atlantic.

"At the present time there must be such preparation, both on the part of the Army and Navy, that an enemy cannot overcome us in the control of the air," said Dr. Walcott. "It has become very evident that in time of war we will have to have a well trained, well equipped force organized to perform their functions.

"Naval scouts to accompany the fleets should include dirigibles and seaplanes for reconnaissance and combat. While scouts for coast defense operations can probably be met by the aviation service, the Army will require aircraft for local reconnaissance and to direct the fire of large guns in coast attacks.

"But what we should develop rapidly and at once are dirigibles or other long distance aircraft that can poise in the air for observation."

Dr. Walcott's recommendation aroused much interest among committee members, who recalled that about a year ago Dr. Walcott expressed the opinion that the Zeppelins had not been very effective instruments of warfare, and he rather discouraged their use at that time by the United States. His attention was called to his former statement by Chairman Padgett.

"I recall my statement then," replied Dr. Walcott. "Since that time, however, my opinion has altered. The success of the naval battle in the North Sea and the successful use of the Zeppelins has convinced me that we must give them serious consideration."

Army and Navy Orders

First Lieutenant D. L. S. Brewster, detached Marine Corps rifle range, Winthrop, Md., to aviation duty, Pensacola.

Lieutenant (junior grade) R. R. Paunack, detached Naval Aeronautic Station, Pensacola, Fla., to the Nevada.

Lieutenant C. E. Wood, to Naval Aeronautic Station, Pensacola, Fla., January 4.

First Lieutenant Claude K. Rhinehardt, 17th Cavalry, attached aviation section Signal Corps as an aviation student to Aviation School, San Diego.

First Lieutenants Leo A. Walton, 10th Cavalry, Arthur Boettcher, detached officers' list; Norman J. Boots, 10th Cavalry, and Edwin B. Lyon, 7th Cavalry, attached to aviation section of Signal Corps, as aviation students, to Signal Corps Aviation School, San Diego.

Capt. Clarence C. Culver, Cavalry, detached list, placed on duty with aviation section of Signal Corps as an aviation student to Signal Corps Aviation School, San Diego.

Steel Fabricating Co. Constructs Hangar for W. Earl Dodge

Mr. W. Earl Dodge, who through patriotic motives has established an Aviation School at Jacksonville, Fla., under the direction of Frederick C. Eden, has installed a portable steel hangar manufactured and erected by the Steel Fabricating Company of Chicago Heights, Ill. The Hangar is 36 ft. wide, 144 ft. long, consists of three 48 ft. bays and is 13 ft. in height.

The Hangar which will house three aeroplanes is a structural steel building, the sides and roof of which are sheeted with painted corrugated sheets.

One of the features which appealed to Messrs. Dodge and Eden was the fact that the building was portable and that additions of as many bays as desired could be made at any time. The building is equipped with skylights and ventilators.

The manufacturers of the Hangar who make a specialty of this type of construction have received so many inquiries regarding steel Hangars that they have reserved space for exhibition purposes at the Pan-American Aeronautic Exposition, to be held in Grand Central Palace, New York, Feb. 8th to 17th next, where a miniature model of Mr. Dodge's Hangar will be shown.

It is practically certain that the Hudson Navigation Co., will operate an aerial line between Albany and New York with the opening of river traffic next spring, according to Chas. C. Clickner, the Albany agent of the company. Two hydroaeroplanes of the largest type are being constructed at the Curtiss works at Hammondsport for spring delivery. The fare will be $100 one way and $150 for the round trip, and it is expected the 150 miles will be covered in two and one half hours.

DESERVED TRIBUTE TO THE LATE LIEUTENANT CLARENCE KING BRONSON

The morning of November 8th, Lieutenant (Junior Grade) Clarence King Bronson, U. S. N., Aviation Corps, and Lieutenant T. S. Wilkinson, U. S. N., of Ordnance, left the Washington Navy Yard in a very capable Curtiss hydro which Lieut. Bronson had been using for several months with entire satisfaction.

Their destination was the Indian Head Naval Proving Grounds, where they were under orders to proceed to test a new type of bomb, containing the highest power explosive known, which was designed to reach and destroy submerged submarines.

Arrived at Indian Head, Lieut. Wilkinson's weight was decided to be inconveniently heavy and he was replaced by Lieut. Welsh, U. S. N., of Ordnance, a man of much lighter weight.

In leaving for their first experiments and for each of the two later experiments, Lieut. Bronson, as pilot, took the front, or observers' seat, and gave Lieut. Welsh the rear, or proper pilot's seat, in order that Welsh might be outside the horizontal wing spread of the machine.

Two ascents were made, each with a single bomb, and the bombs were dropped without unusual incident.

On ascent with the third bomb at a height of about 1,000 feet, and while more or less over mid-Potomac, officers ashore at Indian Head observing the test saw Welsh turn to one side to drop his bomb, when the bomb exploded almost immediately after leaving his hands. The machine was blown apart, apparently near amidships, the front half coming down in a great semi-spiral. It floated a few minutes after striking the water, but sank before boats could reach it.

On account of the spiral descent observers ashore were confident that Lieut. Bronson retained consciousness long enough to shift his controls and procure the spiral, but later it was found his death was probably instantaneous.

Dragging for the machine was immediately begun, but it was not until mid-day of the 9th that it was located. Lieut. Bronson was found still in his pilot' seat, although unstrapped there, his hands still gripping the control.

Of poor Lieut. Welsh no trace has been found.

An official investigation of the disaster is proceeding at Indian Head, but it is likely that the actual cause will never be known. It has been frequently suggested that "somebody blundered," but none of the kin of Lieut. Bronson attach any color of blame to Lieut. Welsh, who was an ordnance officer of unusual ability and distinction for his years and grade, or to any officers of ordnance. It was simply a new device, of great value to the Navy if it could be proved dependable and successful; somebody had to make the test, so they did, as doubtless would cheerfully have done any other of the officers in their respective corps.

On Saturday Lieutenant Bronson was buried at the National Cemetery, Arlington, with full military honors, after special tributes had been paid to him by the Secretary of the Navy by Admiral Benson, Chief of Naval Operations, and by others of his superiors.

Lieut. Bronson's father, Mr. Edgar Beecher Bronson, was one of the organizers of the Aero Club of America and stands with Captain Thomas S. Baldwin as dean of American balloonists. As early as 1874 he made a balloon ascension of twenty-six hours, which stood as the world duration record for thirty years and the American record for thirty-three years. A big-game hunter and the author of a number of books, Mr. Bronson is the kind of men who accept the most severe conditions of life without protest. His son, like his companion, died a patriot's death.

Following is a copy of a letter of Secretary of the Navy Daniels inspired by the disaster and a letter from Mr. Bronson to his friend Captain Nason S. Jarvis, which Captain Jarvis kindly transmitted to AERIAL AGE:

Dear Mr. Editor:

When the Roman citizen "Cincinnatus" threw down his plow and hastened to assemble the young men of Rome to repel the invaders of his country, when the Spartan men and women sacrificed their all to repel the Messenian hosts, or when the "minute men" at Lexington and Concord faced the tyrant bands of England, their spirit of devotion did not perish with them. Their example has borne good fruit in the ages that have followed. Read that spirit in the subjoined letter and let us thank God that we have amongst us men who may well bring the blush of shame to the so-called "Pacifists," the "Safety First Cult," or the mother who "did not raise her boy to be a soldier."

Edgar Beecher Bronson, father of young Bronson, well known as a ranchman, hunter, traveler, writer, aeronautic pioneer, and all-round good fellow, is the author of that letter and the robust American from whom one might expect such sentiments. Such stoicism and love of country is good reading in these days and deserves wide circulation.

The second letter from the Secretary of the Navy to the widow of young Bronson, is a beautiful tribute to the gallant young officer and must prove a source of pride and solace to his bereaved relatives.

Atlantic City, November 18, 1916.

Dear Jarvis:

Thank you so much for your note. I should be sure of your sympathy though you had not written.

Great, indeed, was my son's privilege to meet such a glorious death, on duty in the service he loved and to which he was sworn, engaged in one of its most hazardous functions and doing his duty cheerfully and manfully to the finish, honestly winning a last resting place among the most honored dead of his profession, commended by his superiors and loved by his mates, the echos of three volleys and of bugled taps his requiem.

This don't lighten the blow but it does provide me a staff of pride in his clean, able, and always dauntless record, upon which in my sorrow to lean.

With me still remains his elder brother, not in the service, but whenever his country may need him, he will be sure to be found on one front or the other, I couldn't hold him back if I would—and I wouldn't if I could.

Gratefully yours,
(Signed) E. B. Bronson.

To Capt. N. S. Jarvis, U. S. A.

THE SECRETARY OF THE NAVY
Washington

November 10, 1916.

Mrs. Clarence K. Bronson,
5509 Hurst Street,
New Orleans, La.

My dear Mrs. Bronson:

The Department is deeply grieved to learn of the death of your husband, Lieutenant (junior grade) Clarence K. Bronson, U. S. Navy, which occurred at Indian Head, Md., November 8, 1916.

Your husband has been doing important duty in the Department, much beyond that usually assigned to an officer of his rank, and did it so thoroughly and so satisfactorily as to have won the respect and sincere admiration of all his superiors for his ability, energy and technical skill, in addition to their highest regards for his personal character.

Accept the assurances of the Department's official and my personal sympathy.

Sincerely yours,
(Signed) Josephus Daniels.

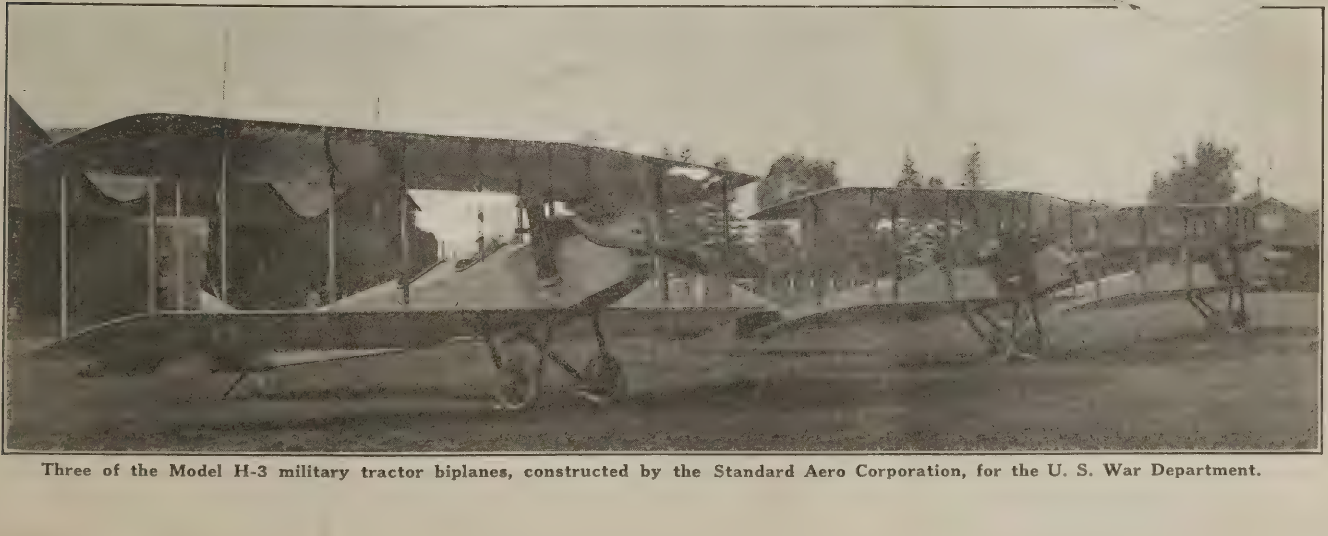
Respectfully yours,
Nason S. Jarvis,
Captain U. S. Army.

No. 1 West 64th Street,
New York City, N. Y.,
November 29, 1916.

Rhode Island Naval Militia Active

The aeronautic section of the Rhode Island Naval Battalion is keeping up its reputation as a hustling organization by taking advantage of the opportunity for instruction at the Pensacola School of Aviation as authorized by the Navy Department. The school will open December 1 and the local section will have four men on the ground ready to begin the three months' course ending March 1.

Ensign Park and Landsmen Whitford, Pray, Fallon and Estey left the city last Friday nigh for Pensacola and on their return will be f lowed by another officer and four men until t entire section has taken the course. Under c mand of Ensign Thomas J. H. Peirce the nautic section has made splendid progre the science of flying, and with the knowle be gained at the school Rhode Island possess an organization second to none country.



Three of the Model H-3 military tractor biplanes, constructed by the Standard Aero Corporation, for the U. S. War Department.

ALUMINUM IN MODERN AUTOMOBILE AND AVIATION CONSTRUCTION

By JAMES E. DIAMOND, Chief Engineer, Aluminum Castings Co.

Reprinted by Courtesy of S. A. E. Bulletin

(*Continued from page 283*)

Types of Cylinder Casting

The smallest cylinder casting is of course that in which each cylinder is a separate unit. I believe only two jobs of this construction have been worked out. In the next larger casting the cylinders are in pairs; both L-head and overhead-valve types have been constructed. In all cases, with the L-head type, the head has been removable. With the overhead-type castings are made in which the head is either integral or removable.

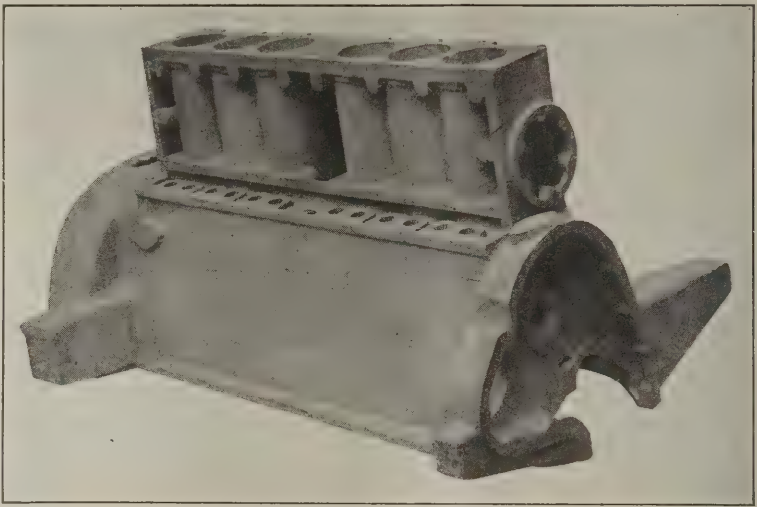
Next comes the four or six-cylinder block casting, of which an occasional L-head has been built, but the overhead construction predominates. Invariably the L-head engines have been designed with remavable heads. With the overhead type, occasionally one has the head integral, although in more of them the head is removable.

By far the larger number of aluminum engines are those in which the cylinders and crankcases are integral. This is an extremely rigid construction, and the aluminum makes a much lighter construction than the iron engines constructed after this design. Here again, the overhead-valve engine is the favored type, although occasionally an L-head is found. Both the Marmon and the new Premier engines have overhead valves. Except in rare cases the heads of all these integrally-cast cylinder and crankcase engines are removable. From a structural and mechanical standpoint, the ideal way to make this engine may be with the head integral, but it multiplies many times the difficulties in the foundry. In the present stage of the art it is doubtful if this type of construction can ever be placed on a production basis. The foundry occasionally finds itself taxed to turn out individual castings with integral heads. The cores in the heads are extremely intricate and require the ingenuity of the best pattern makers and foundrymen to determine how to make and how to hold them properly.

The casting of V-type engines with crankcase and cylinder blocks in one unit seems to be a favored construction among American aviation engine builders at this time. This construction, of course, precludes the use of any material but aluminum. The engines built so far have been of the twelve-cylinder overhead-valve type. There have been individual engines constructed along unusual lines; among these are the Hispano-Suiza aviation eight and the Christofferson aviation six.

Details of Sleeve Construction

down

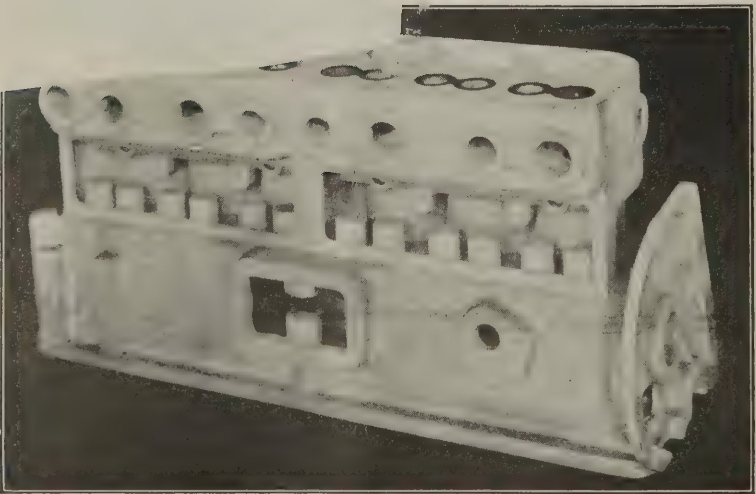


Aluminum casting for new Premier engine.

place. It is essential to get the sleeve into place at once, without loss of time, as otherwise it will heat and expand, sticking before it has been dropped home. This construction, in the main, differs from iron-cylinder construction only in that the piston and piston-rings operate against an iron sleeve. In the overhead-valve construction this sleeve is flanged at the upper end, fitting in a corresponding recess. In the integral-head jobs, of course, it is necessary to put the sleeve in from the bottom.

When the cylinder blocks are not cast integrally with the crankcase, the bottom of the sleeve is machined flush with the bottom of the casting, and is supported although such support is not at all necessary on the top of the crankcase, the cylinder opening being somewhat smaller than the outside diameter of the sleeve. When the cylinder head and crankcase are integral, the sleeve can be flanged at the bottom and held by one or two machine screws. Another method is simply to upset the aluminum about the bottom of the sleeve.

The construction in which an iron sleeve surrounded by an aluminum barrel is by far e most common. Experiments are now beg made on other constructions that I beve have considerable merit. The basis of ese is the more or less standard practice the construction of gas engines of large wer. In many instances these large primeovers are built up, water-jackets and cylders proper being different castings. To rry out this idea with the aluminum engine ould be to eliminate the surrounding aluminum barrel. In other words, the water would come in direct contact with the iron or steel sleeve, the sleeve being held at the top and bottom in such manner as to prevent water leakage. In several of these constructions the equivalent of a stuffing box is used at the lower end to permit a slight endwise play of the sleeve. My own belief is that such provision is totally unnecessary; the difference in expansion between the aluminum block and the iron or steel sleeve is so slight as to introduce no element of distortion.

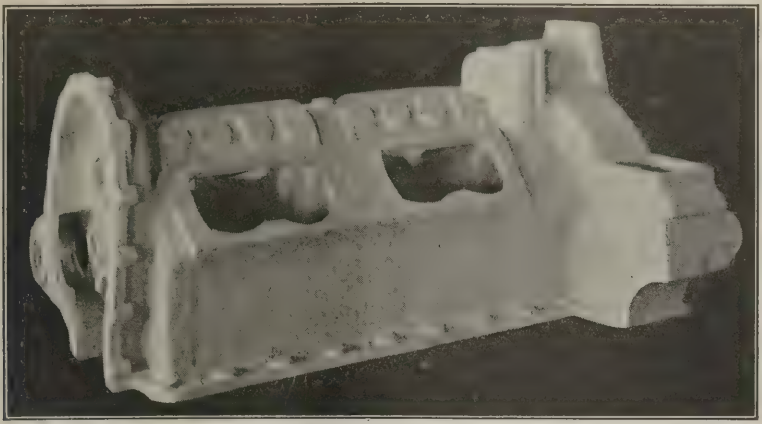


Cylinder block with crankcase showing inserted cast-iron valve-seats.

Methods of Seating Valves

Engines now in production, with the exception of one European aviation engine, seem to have a cast-iron head. The slogan apparently has been, "Safety First" in spite of the existence of a desire to use an aluminum head. Aluminum has demonstrated its ability, if properly designed both as to strength and as to cooling, to withstand both explosion pressures and combustion temperatures. The difficulty has been with the valve seats. Aluminum has worked out satisfactorily for valve seats on the intake side, but not so well for those on the exhaust side. The metal does not melt, but becomes soft and consequently does not stand the constant pounding of the valve. The Peugeot Company has used aluminum in its latest racing engines. The valves, of which there are four to a cylinder, are seated directly in the aluminum.

There are several ways of inserting cast-iron valve-seats. They can be held in the mold and imbedded in place when the casting is poured, or they be screwed into place. I have special reference now to integral head jobs. I have yet to see one of these cast-in valve seats work loose. Great care must be exercised in casting these valves, both in the setting and in the elimination of every possible cause for a "blow." The best method is to put the valve seat into place mechanically. This is not such an easy matter with the integral head, but is comparatively simple where the head is removable, in either an overhead-valve or L-head type engine. Another successful method has been to put a flat plate of cast iron across the head in the case of an overhead valve, and across the top of the cylinder casting when L-head. This plate can be considered an integral part of the casting to which it is attached. When this method was first tried, the fear was expressed that the difference in expansion might throw the valves out of line. Happily, this fear was found to be entirely unfounded.



Crankcase for eight-cylinder engine.

Status of Aluminum Pistons

A discussion of the use of aluminum in modern motor-car construction would not be complete unless mention were made of the Lynite piston. The aluminum piston has come and has come to stay. Any trouble existing has been in the nature of "growing pains." We have learned in the past year that it is not wise to attempt to carry weight-saving to the limit. In other words, we should all be fully satisfied in cutting the weight of an iron piston in half instead of following the exact design of the latter in order to avail ourselves of the two-thirds saving in weight. The metal thus added will have beneficial effects if employed in increasing the length and the wall thickness of the piston. I have always advocated a long piston with a reasonably thick skirt. In a paper* given before the Detroit Section of the Society last winter I advocated a length equal to one and one-third the piston diameter. The long piston with a fairly heavy skirt will take care of piston slap and should help materially in preventing oil pumping. On account of limitations that cannot be removed, occasionally it may not be found advisable to substitute aluminum pistons for iron ones in an engine already built. The piston unquestionably is the heart of the engine, which should largely be built around the piston.

There are two types of intake manifold—one a unit in itself, the other contained entirely within the cylinder-head casting. The former is almost invariably an aluminum casting. This class of casting, while small, is not always the easiest to make. The foundry not only has to contend with thin sections, but with thin sections of considerable length. The finest kind of core work and core setting is required to produce good castings. This applies equally to the jacketed and to the unjacketed types. With the former, core prints not larger in diameter than a pencil must occasionally be made to support the water-jacket core.

Bodies of Cast Aluminum

The Pierce-Arrow Company has always built bodies of aluminum castings and in many quarters considerable interest is being shown in this manner of construction.

The advantages are many in constructing the body with cast aluminum members. When the various sections are carefully proportioned the extreme bracing required in sheet-metal body structures is unnecessary. In the elimination of some of these braces, sufficient weight can be saved to make the body built in the manner suggested as light, if not lighter, for equal strength than the more commonly employed construction. It is certain that the body built up of cast aluminum section is more rigid and sturdier than any sheet-metal body can possibly be. The possibility of body squeaks is eliminated; warping and buckling cannot occur; and the body will outlast the engine. It will stand punishment that would be absolutely destructive of the ordinary sheet-metal body, and after such punishment, more often than not, can be put back into as good condition as it was when new. A careful analysis of costs based on a normal metal market shows that this type of construction is not nearly as much more expensive than the prevailing one as would be expected.

Small Automobile Castings

I shall briefly mention some of the smaller aluminum castings used in modern car design. Innumerable covers—transmission-case covers, gear-box covers and hand-hold plates are usually made of aluminum. In most cases the clutch-cone is an aluminum casting faced with suitable brake lining. Steering wheel spiders are almost invariably aluminum. Not infrequently aluminum footboards are used. Aluminum bearing caps have proved eminently satisfactory. Aluminum carbureters are practically always used on aviation engines. Not much thought has been given the question of aluminum carbureters for automobile engines, and no serious attempt has been made to use aluminum for this part. Pump housings as a rule are built of aluminum castings. Aluminum fans are used on many cars. In a number of cases the radiator tanks are aluminum castings. The radiator frames themselves are often aluminum castings. The hundred and one of the smaller brackets around a car have been cast in aluminum.

None of the smaller pieces just mentioned has any real work to perform; not so with the brake-shoe. The use of the aluminum brake-shoe is another step in the direction of unsprung weight reduction. Aluminum brake-shoes, lined with suitable brake material, have rendered eminently satisfactory service, when and wherever tried. Aluminum brake-shoes have not had much vogue in America, but in Europe both the Panhard-Levassor and the Peugeot companies use Cothias permanent-mold aluminum brake-shoes on all their models, both touring cars and trucks. Ordinarily, brake-shoes of conventional design lend themselves extremely well to production by the Cothias process. We have produced Lynite permanent-mold brake-shoes, in some cases imbedding in the casting a steel slug to take the action of the expansion cam. Unquestionably future development in car construction will be in the direction of refinement of details, and I am certain that the aluminum brake-shoe will be heard from in the next three or four years.

Machining Qualities of Aluminum

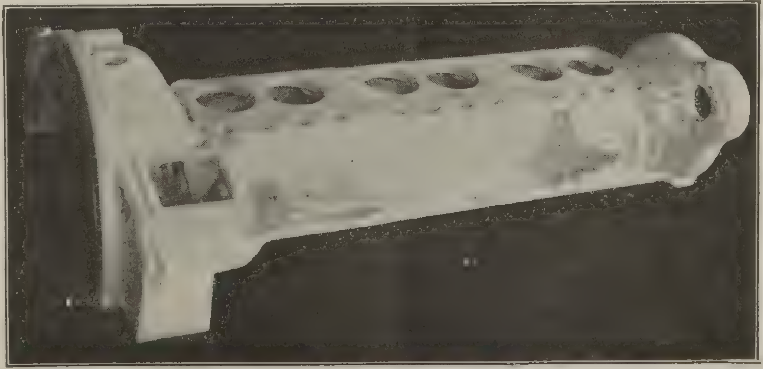
Casting for casting, aluminum can be machined nearly twice as fast as cast iron, resulting in a corresponding reduction in costs. Fewer men, consequently smaller floor space, are demanded when the shop is laid out to machine aluminum, than would be the case with cast iron. Considering the ease with which an aluminum casting can be handled in the machine shop, from the unloading platform to the assembly floor, to say nothing of the rapidity with which the casting can be put through one machine after another, comparative costs will show aluminum, even with the abnormal conditions prevailing with an increased initial cost for castings as a consequence, to be quite competitive with cast iron. When the market is normal, considering initial costs, casting for casting, it will be found that it is cheaper to use aluminum than iron.

Some time ago a certain manufacturer whose crankcases were machined outside his own plant considered the use of an iron crankcase in the belief that he might reduce his costs. It happened that the manufacturer was, and will be for some time to come, dependent on one shop for the machining of his cylinders and crankcase castings. The managers of this outside shop refused point-blank even to consider machining iron cases, stating that the trouble they were having with the one iron casting was quite sufficient.

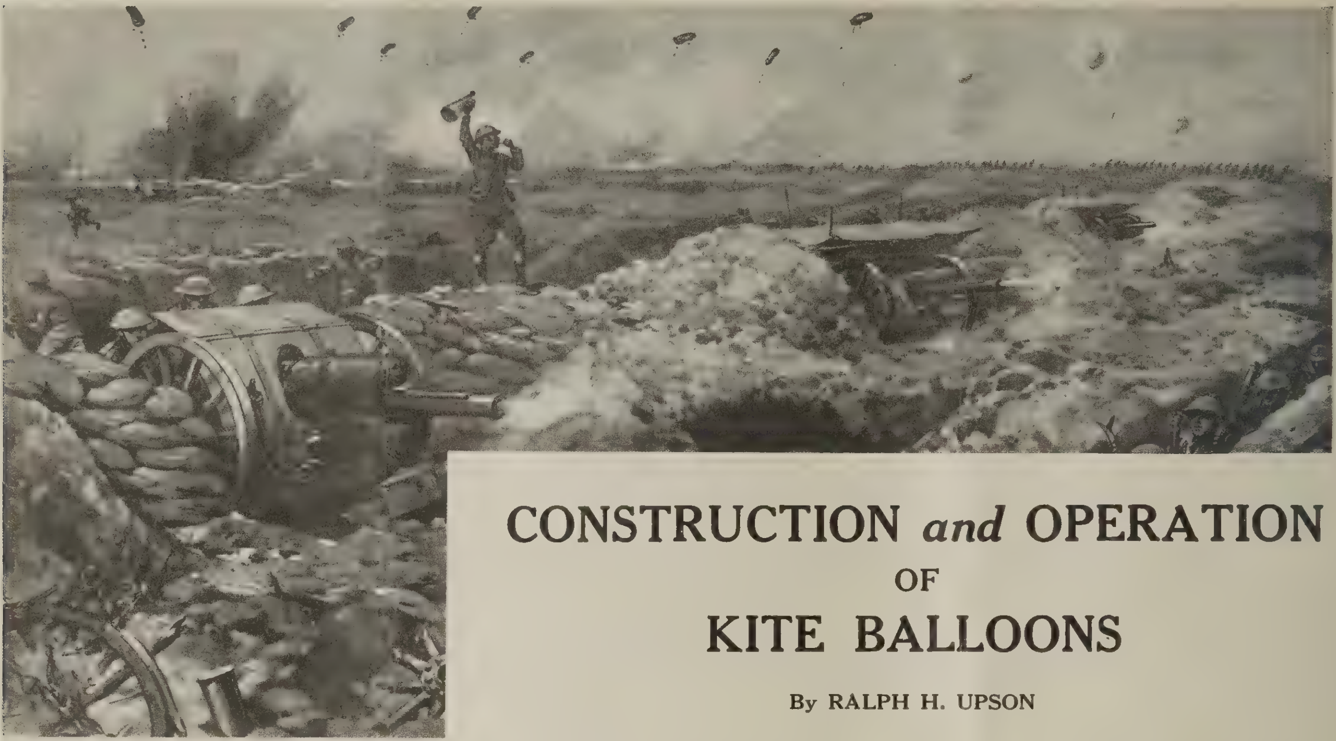
Advice to Engineers

An engineer should bear in mind when designing a structure to be cast in aluminum the wisdom of consulting with the pattern maker and the foundryman. Make the keynote the elimination as far as possible of complicated coring. When it is necessary, bend every effort so to design the job that as much of the coring as possible can be green sand work. Design as far as posible all sections with uniform thickness. In crankcase design do not try to decrease the thickness of the walls below 3/16 in. A thickness of 7/32 in. is better. The number of sound castings will increase appreciably if the foundry is granted this additional metal, and paradoxical as it may seem, the heavier casting can cost less because of the reduction in the defective casting loss. Design cases so that the ribs, brackets and bosses have plenty of taper. Further, have such parts join the main casting with liberal fillets. It is imperative that when a fairly light section runs into a heavy one large fillets be employed. As far as possible, do not use loose pieces on the pattern for bosses. In most cases the green sand is not sufficiently strong and it is necessary to use dry sand cores, thus increasing the expense of the work. As far as possible, crankcase interiors should be so designed that the ribs are far enough apart to do away with sharp sand projections, which complicates the making of cores.

Aluminum has an extremely promising future. When it is recalled that the output has increased from 283 lb. in 1886 to 136,400,000 lbs. in 1914, the tremendous strides that have been made will be appreciated. Aluminum has been really known only for thirty years; iron has been known for a matter of thirty centuries, more or less; its heat treatment is but a development of the past few years. If this is borne in mind, we can easily believe that aluminum will, before many years have passed, be used in places where today the suggestion of its employment would be ridiculed.



Crankcase for six-cylinder engine.



CONSTRUCTION *and* OPERATION OF KITE BALLOONS

By RALPH H. UPSON

It is a fact, acknowledged by the military authorities of the warring nations, that no other single factor is so powerful in the war as the effectiveness of the combination of artillery aided by aeroplanes and kite balloons. The daily reports of the military authorities contain brief mentions of the extraordinary work done by artillery aided by aircraft, and the one aim of both sides at present is to attempt to destroy the air auxiliaries of the enemy's artillery.

Correspondents who visit the different battle fronts tell of seeing as many as forty kite balloons within their range of vision at a single period. The kite balloons are the eyes of the artillery, the observation posts, which, located a few miles in the rear of the fighting lines, enable the observers to sweep the extended horizon and watch the fleet of artillery fire and the movements of the enemy, thereafter transferring the information to their field batteries.

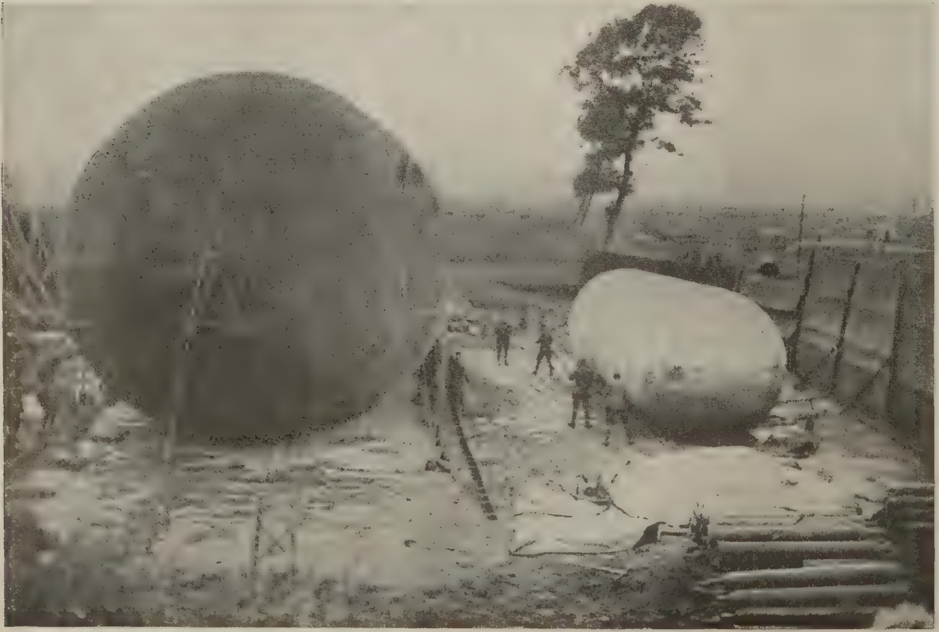
A few days ago, in a report of the visit to the front, Mr. H. G. Wells in analyzing the factors, said: "I visited some French guns during the tir de demolition phase. I counted nine aeroplanes and twenty-six kite balloons in the air at the same time. There was nothing German visible in the air at all."

The United States Army and Navy have at present only one kite balloon in commission and half a dozen ordered. There are seventy-three forts and forty-five field artillery batteries in connection with our land and coast defenses and fifteen naval districts of the entire fleet to be equipped with kite balloons. In other words, hundreds of millions of dollars' worth of defenses are blind, as it were, owing to the lack of aerial eyes, so that the territory which they should protect, would be at the mercy of the long range guns, of vessels lying beyond the point of vision of the artillery observers stationed in the forts of the fleet.

As so little is known in this country about the operation and use of kite balloons, the articles which AERIAL AGE *has arranged to publish will disseminate information concerning the operation and value of kite balloons which will be of great usefulness to our military service.*—[EDITOR.]

THE kite balloon now used in such large numbers in Europe is a combination of two principles, both long known to aeronautical students—the man-lifting kite and the captive balloon. A strong wind was required to fly the man-lifting kite balloon and an ordinary captive balloon could be flown only in comparative calm. The kite balloon synchronizes the best in both and takes care of either condition.

The purpose of this series of articles is to transfer to the



A Russian observation balloon and its "nurse." An observation balloon after inflation may stay in the air for an entire day without receiving additional gas. When it needs replenishing, a smaller balloon, the "nurse," is brought up and the gas it contains is pressed into the larger balloon, the pressing being done by the men, who squeeze the "nurse."

aviation section of our Army and Navy working knowledge of the handling of this type of aircraft.

The apparatus is essentially an elongated balloon which is always kept in an inclined position like a kite. Thus the wind tends to lift it by blowing against the under side. This counteracts the contrary tendency of a wind to blow the balloon over toward the ground.

The outstanding features of the kite balloon are shown in Fig. 1. The shape of the gas bag is modified in such fashion that it has a minimum resistance consistent with other requirements. The steering bag is replaced by an air funnel, C, which is the only inflated protuberance of the balloon. This carries the keel, B, the tail cup, F, and has a value at its lower end through which air enters to make good any deficiency in pressure. In this way a comparatively small hole will supply all the air necessary to keep the balloon well inflated.

The keel, like the funnel, is non-rigid, being supported entirely by a proper balance of forces. Its great advantage over the old steering bag is the fact that it presents a double concave surface to the wind so that it is held in the wind by a positive pressure on both sides at once. In this way any tendency to yaw is stopped almost before it starts. On the other hand, the old type of steering bag will allow considerable deflection or swing of the balloon before its corrective influence is felt. In addition to this the keel has only a small fraction of the resistance of the steering bag, is lighter in weight and is simpler in practical use.

The side fins indicated by A in Fig. 1 are so shaped and disposed that they help in the stability as well as in the kite effect of the balloon.

The function of the tail cups, F, has been reduced almost wholly to one of dampening the motion of the balloon in a gusty wind. Contrary to expectations it was found that the form of construction of the tail cup was a considerable factor in its stability.

The resistance was further cut down by making the balloon more nearly self contained and eliminating superfluous cordage and protuberances.

In other balloons it was found that the gas leakage through the valve and various appendices was commonly many times greater than all other sources of leakage combined. The valve was therefore designed especially to prevent leakage. Its size is more than ample for all requirements of captive or free balloon use. The air valves have also been made tighter and more efficient, thereby cutting down the quantity of air required to keep the balloon properly inflated.

For maximum efficiency the inclination of the balloon to the air must be calculated with considerable exactness. If it is inclined too much it carries the balloon over and puts an undue strain on the cable. On the other hand if the balloon is too nearly horizontal, the lift of the wind is lost. There is a certain best inclination for each balloon at which it is perfectly steady, the pull on the cable is near a minimum and the altitude a maximum. In order to preserve this proper angle for different conditions of use, the basket is made adjustable so that it can be moved forward or back when necessary. In a thirty-mile wind, there should be no motion apparent in the basket; the cable tension at the balloon should be less than 1,000 pounds and an altitude of 4,000 feet readily attainable.

Location of Kite Balloon Aerodrome.

1. Select a field where there are no large obstructions within at least 200 feet or subtending an angle of more than 20 degrees with some central point; at the bottom of a shallow valley or depression is best. Clear the ground of all sharp objects liable to puncture the balloon. The main pulley (8 to 10 inches diameter) should be located at the central point unless the usual wind is from some particular direction.

2. The winch should have a drop of at least 8 inches in diameter or 10 inches if the balloon is to be pulled up and down many times a day. It should be placed about 100 feet from the pulley in a direction to windward of the average wind. Anchor it firmly in position to withstand a straight pull of 3,000 pounds. This can be best obtained by bolting two longitudinal timbers about 12 feet by 10 inches by 2 inches on the bottom. Bury these timbers from 1 to 2 feet deep. It is important to see that the cable pulls exactly at right angles to the drum.

3. The anchor post carrying the main pulley consists of four standard screw stakes, placed pyramid fashion within the eyes screwed down on a level with the ground. A maximum total pull of 4,000 pounds, both vertically and horizontally, should be allowed for. If the ground is not suitable for the use of stakes, a wooden post about 4 inches by 6 inches by 5 feet, with cross bracing of timber must be used.

(To be continued.)

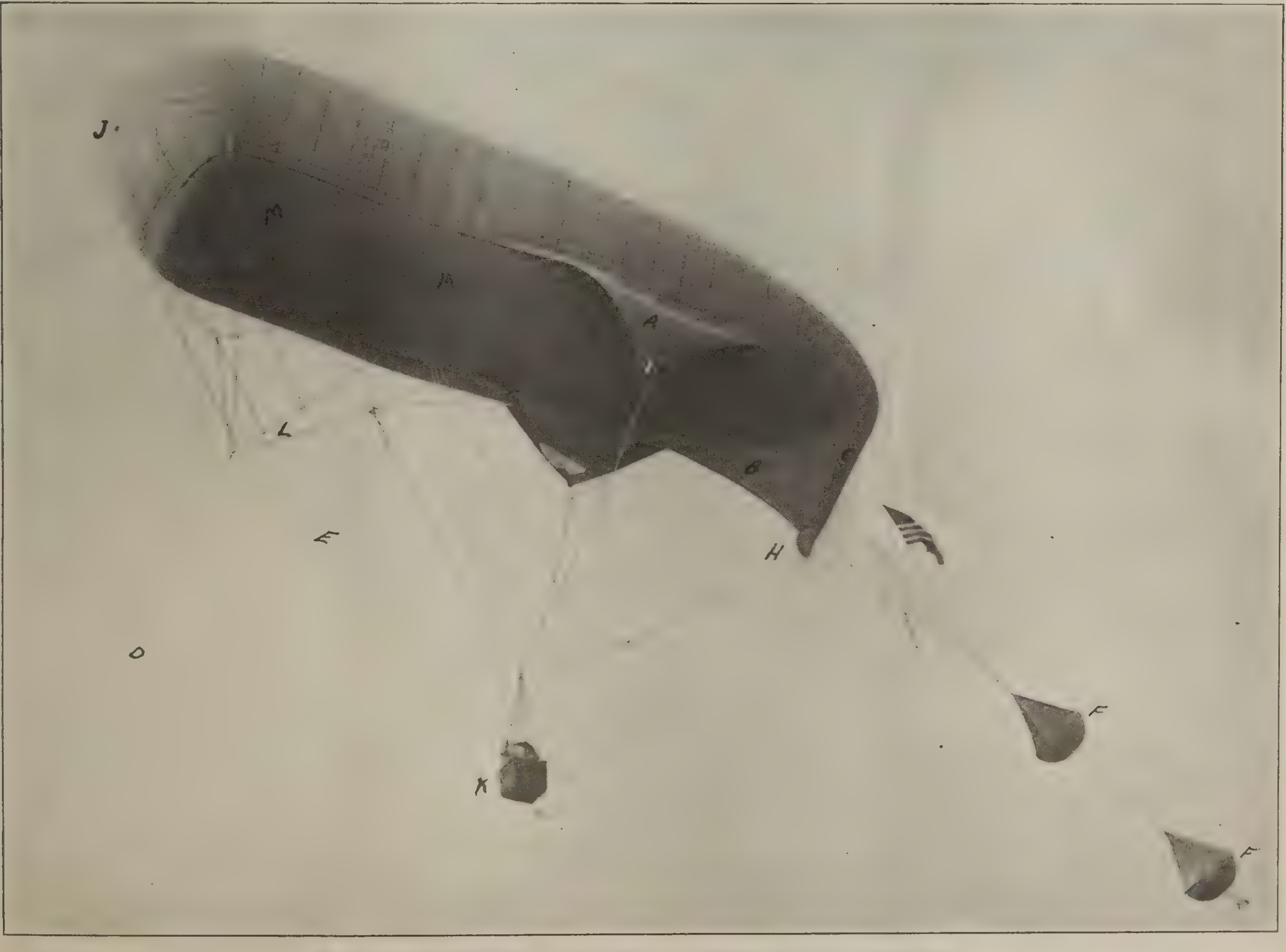


FIG. 1—OUTSTANDING FEATURES OF MODERN KITE BALLOONS.

A—Fins; B—Keel; C—Funnel; D—Holding Cable; E—Maneuvering Ropes; F—Tail Cups; G—Appendix; H—Air Entrance Valve; J—Gas Valve; K—Basket; L—Main Bridle; M—Suspension Groups.

FOREIGN NEWS

FRANCE

Paris, December 9.—Losing himself in a fog in the course of a flight with his escadrille over the Somme front, Dudley Hill, of Peekskill, N. Y., circled around for half an hour over the German lines before finding his way back to French soil to-day.

Several times he narrowly escaped capture, when swooping down close to the ground. He faced machine gun and even rifle fire from the German soldiers. But his engine worked so well that he always was able to speed upward again. He landed safely, behind the French trenches, fifty or sixty miles from his escadrille's headquarters.

The unit in which the American aviators are is henceforth to be known as the Lafayette Escadrille, in deference to the request of the State Department. Corps. Willis Haviland, of Chicago, and Robert Soubiran, of New York, have been promoted to the rank of sergeant.

In deference to the State Department's informal suggestion the French authorities have changed the name of the American escadrille of the French Aviation Corps to the Volunteer escadrille. When the day's report was read on Thursday it included the notice that henceforth the name would be the Lafayette escadrille. Some members are wondering whether later a demand will arise to commemorate also the services of Rochambeau to the United States.

Paris, December 11 (Noon).—Four German aeroplanes were brought down yesterday, two of them on the Verdun front and two in the Champagne, the War Office announces.

Intermittent cannonading occurred south of the Somme last night. The communication follows:

There was intermittent cannonading last night south of the River Somme. Elsewhere the night passed quietly.

During the day of December 10 two German aeroplane were brought down on the Verdun River front by French pilots. One of them fell in flames near Brabant-on-the-Meuse. The other crashed to the ground near Hermeville.

During the same day French aviators delivered several combats on the Champagne front during the course of which Sergeant Sauvage brought down his seventh German machine. The aeroplane fell in flames at Monthois. A second enemy machine was brought down on the northern boundary of Autry wood.

During the night of December 10-11 French bombing aeroplanes threw down numerous shells upon munition depots of the enemy in the region north of Verdun. Several fires and powerful explosions were observed.

The barracks of the enemy at Ronagne-Sous-les-Cotets also have been bombarded.

Sub-Lieutenant Nungesser, of the French Aviation Corps, brought down two German aeroplanes within three hours of each other on the western front, the Paris War Office announced on December 4. This brings his total to twenty.

GERMANY

Berlin (via wireless to Sayville, L. I.), December 8.—The German aerial losses during November were less than those of the Entente Powers, according to an official statement issued here to-day.

The Germans lost thirty-one aeroplanes to the west and east and in the Rumanian and Balkan fighting, while the enemy's losses were seventy-one planes in aerial battles and sixteen shot down by anti-aircraft guns and seven destroyed after forced landings.

The hostile losses totalled ninety-four aeroplanes, of which forty-two are now in German hands.

GREAT BRITAIN

Germany soon will have complete supremacy in the air, according to W. Joynson Hicks, one of the most active members of the House of Commons, who has made a specialty of aviation. He points out the futility of complaining to the Government and appeals to the press to intervene and compel immediate action. He complains at delays and attacks the authorities for permitting the payment of huge commissions to intermediary American contractors.

"While the high powers are quarreling," he says, "the lives of our men are sacrificed and the security of our Army is jeopardized. The casualties among the Royal Flying Corps have increased, and many officers from the front complain that the curve has begun to move in the German direction.

"Our machines are out of date, as against the brilliant new ones that the Germans use. The model that fills up the bulk of our squadrons is a beautiful stable machine, but it is utterly outclassed with its 90 to 100 horsepower engine by the new German machines, the Rumpler, Halberstadt and several others with engines of 240 to 260 horsepower now in use.

"They cruise around over our lines at a height of 18,000 to 20,000 feet, while the bulk of our machines are content with flying at a height of 8,000 or 10,000 feet. A few others can reach 15,000 feet. Everybody knows that in flying height is what the weather gauge was to Nelson.

"The new German machines crash down with all the added impetus of their descent upon our machines with results disastrous to our intrepid young aviators who man them. They are effete machines and nothing more.

"What both services, military and naval, have refused to realize is that success in aviation consists in engine power. This means not only pace, but climbing power. In the German Army everything has been made to give way to higher power in engines.

"There is one mode only in which we cannot merely regain our position but get what we never have had, the command of the air. That is to scrap relentlessly all the lower power engines and build, as an officer of the flying corps with much experience said to me only last week, fewer machines if necessary, but higher powered ones.

"Beyond this there needs to be a very definite inquiry as to the work of the royal naval air service. When the Admiralty was forced to admit last week in the House of Commons that in a contract for supplying aeroplanes from America, running into more than $10,000,000, there was included a commission of 16 per cent., nearer $2,000,000 than $1,000,000, the taxpayer is entitled to ask whether that was necessary, when both the vender and the purchaser were willing and anxious to contract.

"I do not say there was corruption in regard to these contracts in the Admiralty, but I do say that a provision in the purchase price of a commission of a sixth of the total to an English barrister would be enough to put an Attorney-General on inquiry. If we can only get an inquiry thoroughly started I think a good deal more will come to light than the particular contract to which I have referred."

The Parliamentary correspondent of the *Times*, writing on the evidences of dissatisfaction with the conduct of the war, says the resentment of the country has permeated the House of Commons, and the Ministers are becoming daily weaker in their own stronghold. He continues:

"There is no difference of opinion whatsoever about the reason for the growing unpopularity of the Government. It is due entirely to their failure to wage the war with vigor and to organize the nation and themselves. At this moment a half dozen great problems all directly connected with the war and of most urgent importance have been overripe for solution for weeks.

"The man power question has advanced to a stage that is acute, though the whole future of next year's campaign depends upon its settlement early this winter. The air board crisis is still protracted from day to day. While views are exchanged between Lord Balfour and Lord Curzon, the air services wait for machines. Meanwhile the German submarine campaign goes steadily forward, while such insistent questions as arming volunteers and the organization of merchant ship building remain in abeyance.

"So does the question of increasing the production of food. Every expert agrees about the danger. The Ministers have their advice on record, but still days pass and nothing is done. As for the prevention of waste, the Government's proceedings are rapidly becoming a laughing stock."

HOLLAND

How two German aeroplanes, assisted by a submarine, captured the Dutch steamship Koenigen Regentes on November 10 was related by Dr. Howard G. Kimberly, of San Francisco, who arrived from Rotterdam by the Holland-American steamship Ryndam.

Dr. Kimberly was aboard the Regentes bound from Flushing, Holland, to England, with three Americans and sixty-four passengers of various nationalities, when an aeroplane appeared above them and signalled the Dutch skipper to stop, dropping smoke bombs that caused much agitation among the passengers, some of whom supposed the steamship was about to be blown up.

The Dutch skipper kept right on until another aeroplane came out of Zeebrugge, the German airship base in Belgium, and circling around the Regentes, ordered her to stop under penalty of getting into trouble. Then a submarine appeared, having been summoned by wireless by one of the aeroplanes apparently and running alongside the Regentes halted her.

Meanwhile the skipper had called for help by wireless and a Dutch destroyer went out to him. The commander of the destroyer argued vainly with the submarine captain. A Dutch cruiser also appeared. The Germans said they had orders to capture or destroy every boat bound for England with food or ammunition. There were evidently spies aboard the Regentes, Dr. Kimberly said, as packages and documents were thrown over the rail and gathered up by the submarine and other German warcraft that had come out.

As the Dutch steamship neared Zeebrugge her skipper was ordered to watch his course and keep more to the north so to avoid mines. The skipper said if he followed directions he would ground on flats, and he declined to obey the German officer in charge of the squadron. The officer said if the Dutch skipper were not careful a torpedo would be sent into him and he shouted back: "Go ahead and fire!"

Then the angry German sent two officers aboard and they took command of the Regentes and piloted her into Zeebrugge, where the passengers, including several Belgian women, received their baggage and were put on a train that eventually took them after many stops on sidings to the Dutch border.

ITALY

In his allocution delivered before the Secret Consistory in Rome on December 4, Pope Benedict denounced the aerial bombardment of open cities and condemned all those who, he said, had defied the laws of God and man in the present war. The Pope said:

"It is well to recall, aside from the laws of God, that if even the law of man was obeyed at present, peace and prosperity would reign in Europe. If we neglect or disdain laws and authority, discord is the sure result. This is the highest social law. As a result of ignoring this law we see every principle of right violated in Europe, acts committed in defiance of the laws of God and man, peaceable citizens and even young boys taken from their homes to fight amid the tears of wives and mothers, we see open cities and defenseless inhabitants exposed to aerial attacks, and we see by sea and land nameless horrors. I cannot but deplore again these crimes, and condemn all those by whom they are committed."

JAPAN

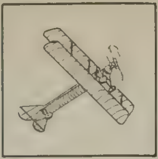
The following is from the Kobe *Chronicle*:

Friday, November 3.—The first stage of the long distance flight between Tokorozawa, near Tokyo, to Kurume in Kyushu, arranged by the military authorities, was successfully carried out on the 2nd inst. though one of the aeroplanes was obliged to descend on the way. At 6 o'clock in the morning the first aeroplane, piloted by Lieutenant Saito, started from Tokorozawa on its westward journey, followed by three other machines at an interval of a few minutes. The Hakone Mountains were passed about 7:20 and Shidzuoka shortly after 8 o'clock. The first aeroplane appeared over Toyohashi at 9:10 and safely landed on the parade ground, followed by the others at an interval of a few minutes.

At 11:15 all the four aeroplanes, boarded by new aviators, left Toyohashi for Himeji. After crossing Ise Bay the aviators struck for the Suzuka range, which is regarded as the most difficult place on the Toyohashi-Himeji section. Here one of the machines was compelled to alight near Tsu owing to engine trouble. The three others, however, successfully negotiated the Suzuka range and passed over Nara at about 1:45 and Osaka at about 2:10 .

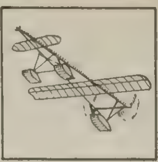
At Kobe the first aeroplane was sighted at 2:30, followed by the two others at an interval of a few minutes. The passage of these machines was watched by a large number of people.

The first aeroplane safely arrived at Himeji at 3:09 and was duly followed by the two others a little later.



MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



Dr. F. W. Buck, Inventor of the Aerial Torpedo, to Organize Model Club in Lincoln, Nebraska

A model aero club of Nebraska—whose members will build model aeroplanes and hold contests under the auspices of the Aero Club of America—is being organized in Lincoln by Dr. F. W. Buck, 1308 O street, who recently moved to Lincoln from Denver.

Pointing out that many such models made during the past year have made successful flights of from 500 to 1,000 feet, the doctor says that this new sport promises to rival baseball, football and even horse racing.

Dr. Buck is the inventor of the aerial torpedo, operated on the same principal as the model aeroplanes, and other devices, and is a member of the Aero Club of America and the National Institute of Efficiency.

During the past year he has constructed nine different model planes, seven of which are full sized. The motive power of these models can be furnished by rubber strands or from compressed air engines.

Names "Flying Day"

It is the doctor's plan to have a "flying day" about Saturday, January 13, when all contestants will compete in class and sweepstake prizes. With this in view, he announces that his office will be open Saturday morning only, during the first three Saturdays in December, for contestants to call and get information. Those not living in town have been asked to write to him.

He expects to go to the Pan-American aviation congress at the Grand Central Palace in New York City February 8 to 15, and if any Nebraska boy succeeds in breaking a record for a model aeroplane flight, he will take his model and exhibit it at the congress, in the model aeroplane department.

Any one, from a small boy to a grown-up, can join the club, and aeroplane outfits—real ones that will fly—can be built for from $1 to $40, according to the ambitions of the maker. Materials, including blueprints of different designs, with full instructions for making them, can be ordered from different houses in New York or Chicago.

All the larger cities of the east, the doctor says, have clubs of this kind, from which boys and men of mechanical turn of mind can derive no end of fun and amusement.

Suggests Classes

Dr. Buck suggests that the club, as soon as organized, should adopt a set of rules and bylaws and that the different styles of models should be limited to the different ages of the students, as some models are much more easily constructed than others; and as it will be a permanent organization, that the members advance from one grade to another. Any boy in the lower grade advances to the nevt as soon as he has made one successful flight. He would start the younger boys on the cheaper models, something on the following plan:

Class E—For students under 12 years of age to become members they would have to purchase outfit and build glider. Outfits in this class would cost about $1 each.

Class D—Students 12 to 15 years to build monoplane models for which blueprints and material can be purchased for from $2 to $5.

Class C—Students between the ages of 15 to 18 years to purchase outfit and build model biplane or twin-motored monoplane. Outfits in this class cost from $2 to $5.

Class B—Open to any students of any college or high school in the state over 18 years of age. Requirements from them would be to purchase blueprints and materials and build the hydro-aeroplane which would cost from $4 to $8 each; models in class B, D and C would fly with rubber motor power.

Classes for Men

Class A—Open to anyone that is not a student, which would give the men a chance as well as the boys. Members for this class to purchase material and build an aeroplane of not less than a four-foot span, using their own judgment for design, but must use compressed-air or other form of engine, complete materials for this class, including engines, can be purchased from $10 to $40.

In staging a contest of this kind, it would be necessary to set some day to have the models completed, say, on the first Saturday of January. Models could then be inspected in regard to their balance and construction, the propellers could be furnished, and then any changes that might need to be made could be taken care of during the next week.

Arrangements can be made for each model maker to receive a handsome diploma from the Aero Club of America.

Scientific Models

(*Continued from page* 341)

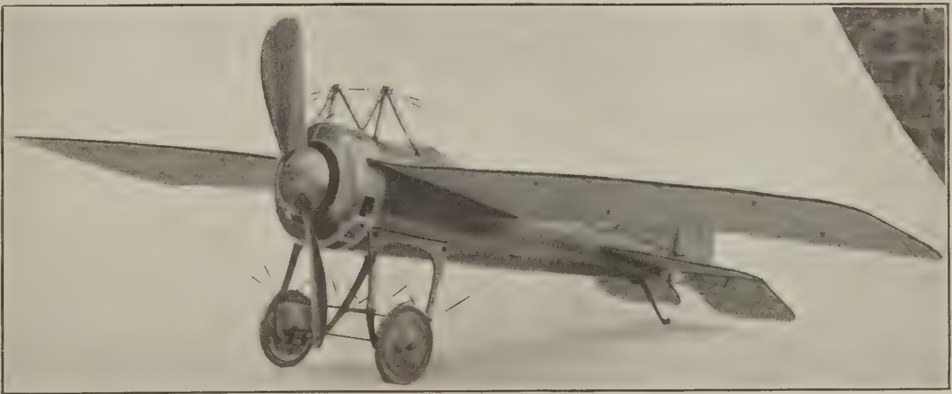
If many of our experimenters and inventors would take to model flying for some time and thereby learn the fundamental principles of aerodynamics, the loss of much time and money, in many cases, might be averted.

While it is true models were brought to their present state by those who cared for little else than sport, yet the results arrived at by these empirical methods would probably be most useful to builders of large machines. The result has been most scientific, in spite of the method. Whether a person might derive any benefit from racing models, depends entirely on himself. If he chooses to make his work scientific, he will be amply rewarded for his efforts.

Undoubtedly a good many improvements can be made in the holding of contests. It is difficult to ascertain which model is the most scientific when a 2 oz. machine is pitted against a 6 oz. model. If the minimum weight of the aeroplane, exclusive of rubber, would be placed at eight oz. and the maximum weight of rubber not to exceed 8 oz., then the model flying longest with the least amount of rubber would be most efficient. Thus a 12 oz. machine flying with 4 oz. of rubber would have to remain in the air but ⅔ of the time to equal a 16 oz. machine driven by 8 oz. of rubber in efficiency. It will be seen that such a contest would make the problem entirely aerodynamical, and not a test of the constructive skill of the designer in endeavoring to have an 8 oz. machine carry the greatest amount of rubber practicable.

There is no denying that much might be said in favor of models built to scale, provided that care is not only taken to have the dimensions of the wing surfaces, but also the center of gravity, as near as possible like the full sized machine. This is particularly true of model hydroaeroplanes.

Conditions more closely proximating those found in large machines cannot be created until some satisfactory substitute for rubber bands as motive power is found. A great many attempts have been made, but a thorough success has been made in no case. A satisfactory tiny gasoline engine is yet to appear. When this has taken place, real progress in model work will begin. Machines will then have about 6 ft. spread, and weigh a few pounds. Modellists will then be able to better study landing devices, etc.



The model shown in the accompanying photograph was designed and constructed by Mr. Henry Rompel, of Kansas City, with the assistance of Spencer T. King. The model was designed after the Gorden-Bennett Deperdussin Monocoque, and from the photograph it represents a splendid example of skill. Through the courtesy of Mr. Rompel, we shall print in our next issue a complete description of the model, in addition to a description and photograph of a six-cylinder carbonic gas motor, which he constructed also.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

"Flying Thoughts" of an Onlooker

I wonder just how it does feel 'way up there
A thousand or more feet suspended in air?
Do the troubles of Life fall away or remain
And just what effect is produced on the brain?
Does the lightness and buoyancy of ether make clear
All that puzzles and annoys in this hemisphere?
Just what is the feeling if you cannot restrain
The thought of the "drop" with the accompanying pain?
Are you wan, are you timid, do you feel sad or gay
Is reason suspended, would you let happen what may?
Do you look up or down or reflect on your sins
And sense that your life could be bought for two pins?
Or does the perspective of Life and its ways
Make all seem bizarre—appear small to your gaze?
Does the cool quiet influence of cloud and vast space
Sink down in your consciousness and deepen apace?
Would you wish to float on without ties and carefree.
And prolong these conditions indefinitely.
Looking up from the ground to the machine in the air
One ponders if e'en by chance they'd be there.
And whether or no they'd have courage to start
In that huge "Dragon Fly" or would they lose heart.
So far, I have never been put to the test
But I hear the sensation is "odd" at its best.

I. P. Priest.

A Mad, Mad, Wag

Far be it from us to drag divorce suits and sich like into our hitherto unblemished column, but the following item in the examination of Charles Wax, the original Oliver Osborne, does not deserve to pass unnoticed:

Acting Warden John J. Flynn was waiting at the door of the Tombs to receive Wax. The prisoner kept his coat collar turned up and his hat pulled down until he was led before the warden's desk, the handcuffs taken off and Warden Flynn started to ask him questions.

"What is your name?"

"Wax," answered the prisoner.

"How old are you?"

'Fifty-six,"

"Where do you live?"

"Chicago."

"Chicago is a pretty big place," said Warden Flynn. "What part of Chicago?"

"That's all right," said Wax. "Put it down. I live all over Chicago."

"What is your occupation?"

"I'm an aviator."

"I fly pretty high," he was heard to say in an undertone, with a laugh, as he was led away from the desk.

When he went into his cell he was grinning.

Lament

From the Nest of the Eagle.

Neath azure Sky, neath Sun and Moon,
And sometime storm-clouds hov'ring near,
Mid'st Wintry Blasts, or Autumn gale,
And Of'times, Summer zephyrs, Dear.

I perched me on my rock-bound ledge to view
A peaceful valley spread below
Where life in everchanging scene
Of birth and death, and strife did ebb and flow.

Came challenge to my haughty crest.
A feathered monarch of the air,
Whence upward from the fields below
A winged monster from its lair.

Clangorous, with a strident roar
Of valves, crankshaft, propeller blade,
Whirring, barking with staccato voice,
My aerial realm did then invade.

The reek of gasoline and oils
One hundred horsepower'd strong
Made my poor olfactory nerve
A revel 'gainst such wrong.

Deposed, forsaken on my ledge,
I dar'st not spread my wing.
I can't compete with gasoline,
Stuffed in that man-made thing.

Of canvas, sticks, and steel wire strings
Of wings, two decked, that looks so dour,
That loops-the-loop and volplanes
At one hundred miles per hour.

And now a poor old bird am I,
My feathers droop and sicken,
Alas, I am but a fit mate
For some old barn yard chicken.

"The need of an efficient stabilizer is strongly felt."

[Recent committee report on aeronautics.]

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Recently piloted by Victor Carlstrom 661 miles, when equipped with pontoons, in 8½ hours in flights for the Curtiss Marine Trophy, making greatest mileage for this contest so far recorded.

THE CURTISS AEROPLANE CO.
BUFFALO, N. Y.

(*Continued from page* 358)

plane, makes this big aeronautic exposition loom up large before the American people. Those who are following in nenswapers and magazines the progress of the European conflict realize the wonderful strides that have been made in aviation since the war started, and it is evident that within five years from now aircraft will be used extensively for commercial purposes and the aeronautic field will offer splendid opportunities for the young men who are now in universities and technical schools fitting themselves for careers.

Nearly all of the space on three floors of Grand Central Palace has been sold for the exposition. This demand for space reveals the fact that this exposition is to be far more important and comprehensive than even the promoters originally dreamed, and people generally are anxious to see what great strides have been made in aircraft invention and to see it all illustrated at one time under one roof.

The recent remarkable Chicago-New York flight of Ruth Law and the fact that Congress has appropriated close to $20,000,000 for the construction of aerial defenses are things which are bringing the aircraft industry into the limelight.

The Aeronautic Exposition is being promoted under the auspices of the Aero Club of America, the Pan-American Aeronautic Federation, the American Society of Aeronautic Engineers and the International Exposition Company. Howard E. Coffin is chairman of the Show Committee. Thousands of the most modern inventions of aeronautical nature—models of monoplanes, biplanes, multiplanes, balloons, dirigibles and tons of their accessories—will be on exhibition, together with the following displays: The Army and Navy aeronautical exhibits, National Guard and Naval Militia sections, National Advisory Committee for Aeronautics' Exhibit, Aero Club of America and Pan-American Aeronautic Federation Salons, Aero Coast Patrol Exhibit, American Society of Aeronautic Engineers (standardizing section), Intercollegiate section, Aero Map and Landing Place Exhibit, Pan-American Union Exhibit of relief maps, etc.; Post Office Exhibit of maps and locations of 200 proposed aerial mail routes and Smithsonian Institution Exhibit.

Recognizing the importance of aeronautics and its close connection with the Automobile accessory business, the First Pan-American Aeronautic Exposition was discussed and acted upon by the Executive Committee of the Motor and Accessory Manufacturers at the monthly meeting in New York, Friday, December 8.

Following an interesting talk by Howard E. Coffin, of the Hudson Motor Car Company, and chairman of the Pan-American Aeronautic Exposition, who thoroughly explained the objects of the aeronautical exhibition and aeronautics in general, it was voted to appoint a committee of three to confer with similar committees from the National Automobile Chamber of Commerce, the Aero Club of America, the Pan-American Aeronautic Federation and the American Society of Aeronautic Engineers, at which time the matter of officially approving the aeronautical show will be discussed. Those who will represent the Motor and Accessory Manufacturers include C. W. Stiger, president; C. E. Thompson, chairman of the Show Committee, and William M. Sweet, director.

During the exposition there will be held a series of conferences, at which the aeronautical authorities of different countries will discuss important phases of aeronautics and submit and outline plan to foster greater developments in the utilitarian, military and scientific branches of aeronautics. Arrangements for the great transcontinental aeroplane contest will be perfected at that time.

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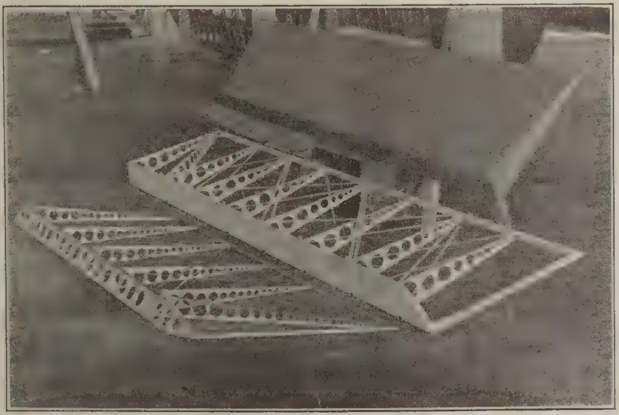

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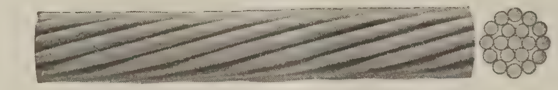

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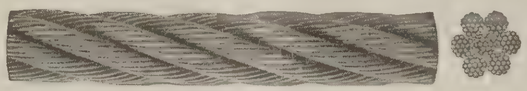

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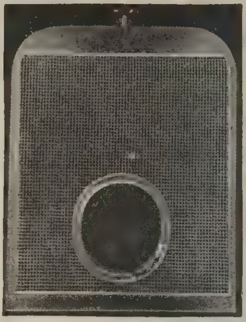

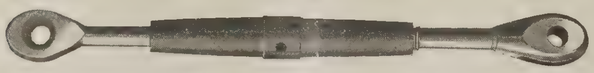

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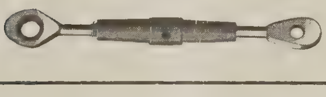

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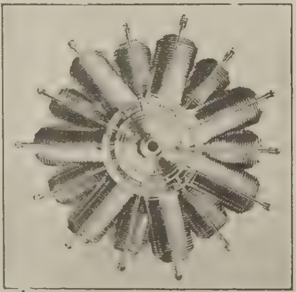

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WANTED—BOUND VOLUMES OR SINGLE copies of the following magazines: Aircraft, Aero and Hydro, Fly, Flying 1st volume. English publications: Aero, Flight, and The Aeroplane. Address Box 105, Aerial Age, 280 Madison Avenue, New York City.

FOR FLORIDA SEASON, PRACTICALLY new Flying Boat Factory overhauled, dep control or to suit buyer. Without motor $1400, with Curtiss O. X. $3000. Complete equipment and shipping crates. Apply Aerial Age, Box 104, 280 Madison Avenue, New York City.

INTERESTED IN AERONAUTICS? IF SO, why not join a progressive Club. Be associated with those who possess expert knowledge on the construction and flying of model aircraft and aviation in general. Write for information. Aero Science Club of America, Secretary, Engineers Building, 29 West 39th Street, New York City.

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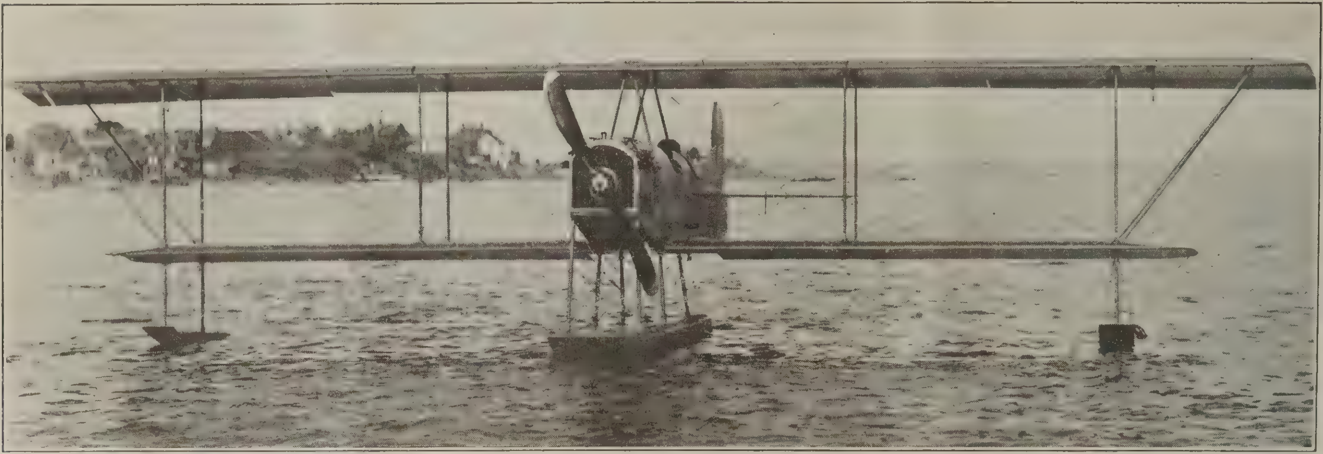

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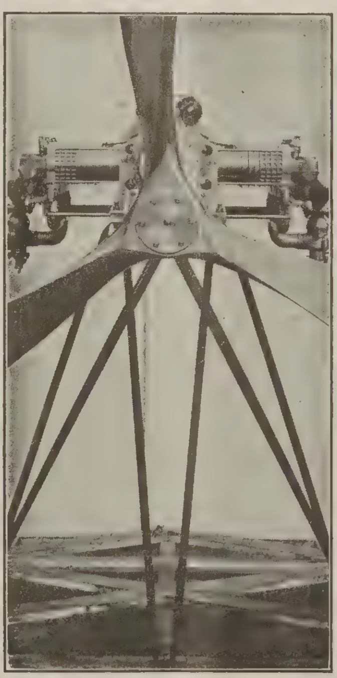

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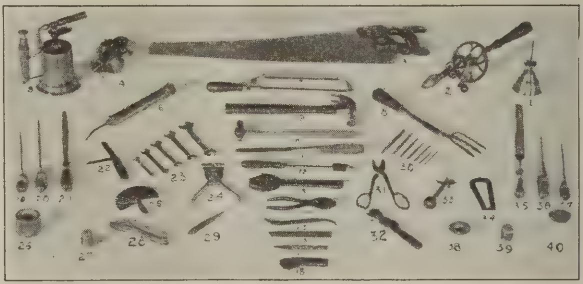

THE accompanying illustration shows the compactness and completeness of the Cooper Aeronautical Tool Box. With the assortment of tools shown the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

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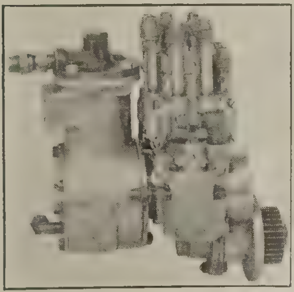
Bridgeport, Conn., U. S. A.



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THE marked efficiency of the Christensen Self Starter is perhaps best suggested by the results of a test on a Hall-Scott Motor made at the Standard Aero Mfg. plant in Plainfield, N. J. There on a tank of air of 250 pounds pressure, 28 complete starts were made without recharging the tank, and the last start was made on the low pressure of 100 pounds.

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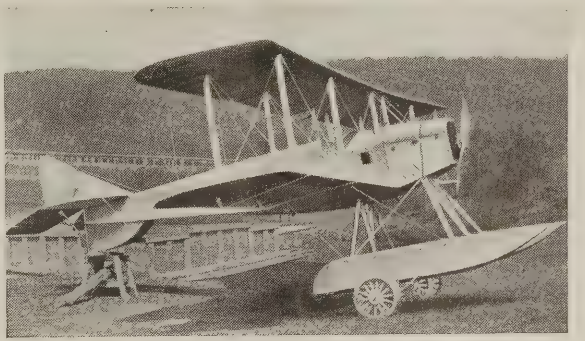

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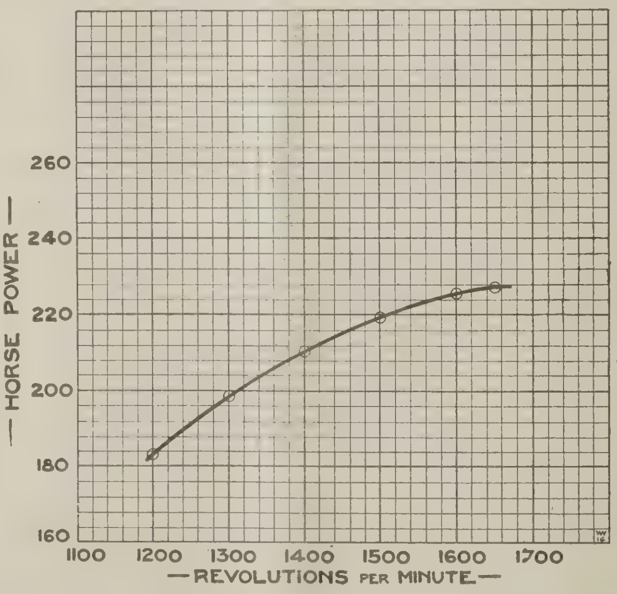
Curtiss

MODEL VX-3 motor was used by Victor Carlstrom on November 2nd in flying from Chicago to Erie, Penna., a distance of 452 miles, in 3 hours 57 minutes.

Owing to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

CURTISS AEROPLANE & MOTOR CORPORATION

BUFFALO, N. Y.

27.105
AEA
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AERIAL AGE
WEEKLY

VOL. 4, No. 15 DECEMBER 25, 1916 10 CENTS A COPY

Aero Club Asks Council of National Defense to Solve Problem of Patent Royalties

Miss Ruth Law Honored at Banquet

Chicago-New York Aerial Mail Planned

The Model R-4 Curtiss Military Tractor Described

THE FIRST
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TO FOLLOW THE AUTOMOBILE AND MOTOR BOAT SHOWS

Held Under the Auspices of

The Aero Club of America
The Pan-American Aeronautic Federation
The American Society of Aeronautic Engineers

THE preliminary announcement of the plans of the First Pan-American Aeronautic Exposition has created such tremendous interest, and so many requests for space have been received, that the original plans are being extended and the show space is being doubled.

The Exposition will afford the opportunity to show the tremendous progress that has been made in American Aeronautics in the past two years.

The people of two continents will come to the Exposition to see what the American Aeronautic Industry has produced for National Defense, utilitarian purposes and sport.

> The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos - Dumont, Honorary President, Pan-American Aeronautic Federation.

> Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

APPLICATIONS FOR SPACE SHOULD BE ADDRESSED TO

HOWARD E. COFFIN
CHAIRMAN, ORGANIZING COMMITTEE
Pan-American Aeronautic Exposition
297 Madison Avenue, New York

"IT'S IN THE SPOKES"

AFTER four years' exhaustive tests, The Ackerman Wheel Company offers to aeroplane builders a wheel of special design that will solve many of the difficulties hitherto encountered.

A series of successful laboratory tests were recently concluded. As the illustrations indicate, the wheel was attached to a large case, into which was loaded 1,500 pounds of sand. A side thrust blow, with the wheel seven feet removed from the point of contact, was calculated to give the wheel a stress of 27,000 pounds. This was when the wheel struck the plain floor surface. To test the wheel to its maximum, two cleats of wood were nailed to the floor, four inches in advance of the striking point, and under this test four spokes of the wheel were broken. Calculation showed that the energy of the blow totalled 49,800 pounds.

A special alloy, specially treated, is used to meet all conditions that the wheel can be subjected to. The steel receives a special process in the treating, so that it will give the required resiliency, starting at the center of the curve and gradually growing stiffer and stronger both to the hub and relative to the structure of the spoke. The spokes being made on the curve, they are hung on the hinge at the rim, being a unit in the hub, allowing them to open and shut according to the load placed on the hub.

In the aeroplane wheel it is found that the hub will leave the center four inches when maximum loaded, and return to center as load is decreased, without the springs taking a set. There has never before been a wheel invented which would meet any such conditions.

These wheels can be built according to size and weight of any load from 500 pounds up.

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Figure 1

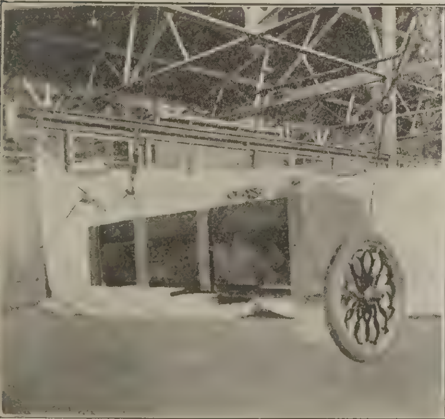


Figure 2

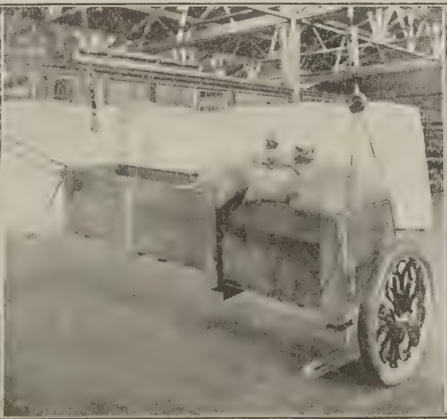
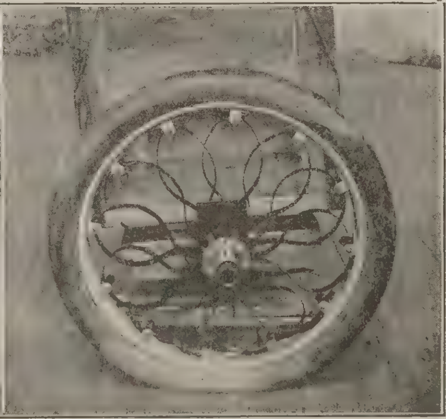


Figure 3



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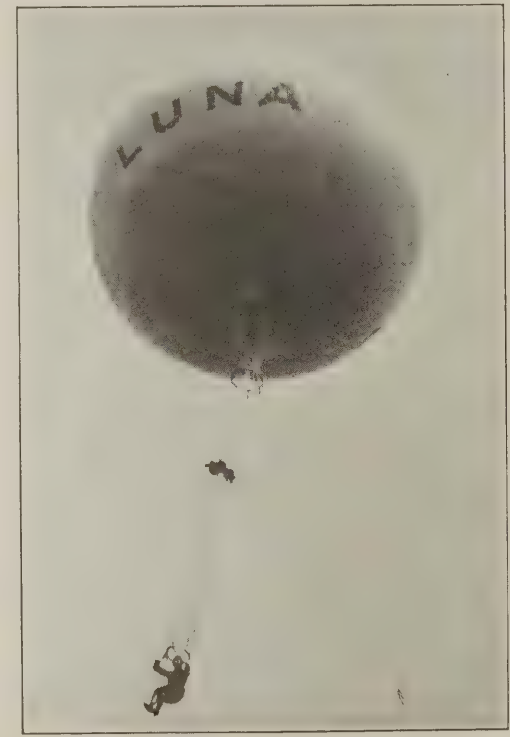

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AERIAL AGE
WEEKLY

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VOL. IV NEW YORK, DECEMBER 25, 1916 No. 15

AERO CLUB OF AMERICA ASKS COUNCIL OF NATIONAL DEFENSE TO SOLVE PROBLEM OF PATENT ROYALTIES

FOLLOWING its usual constructive policy, the Aero Club of America, to solve the problem which threatens the sources of supply of aeroplanes for national defense, has asked the Council of National Defense to consider ways and means of solving the patent royalties problem.

On December 18 the Wright-Martin Aircraft Corporation notified the constructors that they are expected to pay royalties amounting to 5 per cent of the gross receipts for the privilege of using the features covered by the Wright patents, with a minimum of $10,000 a year for each constructor.

On the following day they were notified by the Curtiss Aeroplane & Motor Corporation that they are expected to secure a license from the Curtiss company for building hydroaeroplanes and flying boats, the Curtiss company holding patents on same. This last notice does not state the amount of royalties expected by the Curtiss company, but the constructors realize that if Curtiss should follow the example of the Wright-Martin company to also ask 5 per cent of the gross, then they would actually lose money in filling the Army and Navy contracts. Therefore, they would not be able to continue in business.

This followed the appeal made to the club by aeroplane constructors who appealed to the club to bring about some kind of arrangement which will enable them to keep in business and fill Government orders which they have or have bid for.

The matter was considered at the meeting of the Board of Governors of the club on December 20, and it was decided that the Council of National Defense, whose prime mission is to develop sources of supply of products necessary for national defense, is the logical organization to consider ways and means of solving this serious problem, which threatens the sources of supply of aeroplanes for national defense and may delay the establishment of the additional aviation schools needed to train aviators for national defense.

The Wright-Martin Aircraft Corporation issued the following statement outlining the company's future policy concerning patent licenses:

"The Wright-Martin Aircraft Corporation, which acquired the Wright patents, has taken action which, it is hoped, will bring peace between the various aeroplane companies in this country, by granting licenses under the basic Wright patent. A letter announcing the decision of the Wright-Martin corporation to grant licenses to other companies making aeroplanes, together with an application for license and a form of license, has been sent to various aeroplane manufacturers, and copies have also been sent to various officials of the United States Government who are naturally interested in this proceeding. In this letter, Mr. Edward M. Hagar, president of the Wright-Martin Aircraft Corporation, says:

> "Dear Sirs: The title to the basic Wright patent on aeroplanes has just been acquired by Wright-Martin Aircraft Corporation. This corporation believes that it is for the best interests of aeronautics that all responsible makers of aeroplanes should be free to conduct their business without danger of suit under this patent. Accordingly, a standard form of license agreement has been drawn up, a copy of which is enclosed. It is our intention to grant a license in this form to any corporation that desires to undertake the obligations of the agreement. In regard to corporations that have in the past manufactured aeroplanes in infringement of this patent, we plan to waive all claims for past damages or profits upon making a payment as outlined in the enclosed application.
>
> "If you desire to acquire a license, please read the enclosed papers and return the application and license to us properly executed together with your check. Royalties that accrue during the balance of this year may be treated as though accruing during January, 1917.
>
> "To the manufacturers and corporations whom we accept as licensees under this patent we give the benefit of national publicity carried on by us. This means that everyone interested will thoroughly understand that machines built under this patent employ the universally adopted and basic principles of control for aeroplanes—the Wright patent—which has been sustained. Its new owners do not intend to allow it to be disregarded."

Mr. Hagar, president of the Wright-Martin company, said:

"The license which the Wright-Martin Aircraft Corporation proposes to issue is for 5 per cent on the gross business, with a minimum annual royalty of $10,000 a year. Very great interest in this matter is likely to be felt in Washington, because many of the companies which have sold machines to the Government have given assurances that if the Government has to pay royalties the company will make good. The Wright-Martin Aircraft Corporation releases all companies on all machines made prior to 1916 on their taking out a license and paying a royalty on their business during 1916. This is offered in spite of the fact that the law provided that the Wright-Martin Aircraft Corporation may bring an action in the Court of Claims for royalty on all infringing machines the Government has purchased. The offer will not remain open indefinitely."

In connection with the dispute over the Wright patents, it may be of interest to quote from the decision of the Court of Appeals when it passed on the Wright patents, agreeing with the Court below, Judge Hazel:

> "We are in full accord with the reasoning by which he, Judge Hazel, reached the conclusion that the patent in suit is a valid one and that the patentees may fairly be considered pioneers in the practical art of flying with heavier-than-air machines and that the claims should have a liberal interpretation."

THIRTEENTH ANNIVERSARY OF SUCCESSFUL FLIGHT

December 17, 1903—Orville Wright made the first flight in an aeroplane from off Kill Devil Hill, at Kitty Hawk, N. C. The following day he made a flight of three miles at a speed of eight miles an hour against a twenty-one mile wind and controlled the "Wright Flyer," from a prone position to lessen wind resistance. The machine had a plane area of 510 square feet and was equipped with a four cylinder, four cycle, 4 x 4 gasoline engine, made by Orville and Wilbur Wright.

December 17, 1916—Thousands of aeroplanes are in active use. One, with twenty-one persons aboard, reached an altitude of 7,000 feet, and another, carrying a load of fifteen tons, made a successful flight, while a speed of 124 miles an hour is recorded.

MISS RUTH LAW HONORED AT BANQUET

MORE than four hundred persons prominent in various lines of scientific activity, and chiefly in aeronautics, including the discoverers of the North and South Poles, were among those who attended the dinner to Miss Ruth Bancroft Law at the Astor Hotel, December 18th, in honor of her having established a new non-stop record in aerial flight, when she flew from Grant Park, Chicago, to the fair grounds at Hornell, N. Y.

The record established by Miss Law bettered that of Victor Carlstrom, who because of certain important tests he is making with military aeroplanes, could not be present, but both Miss Law and Mr. Carlstrom were remembered by the Civic Forum and the Aero Club of America, under whose auspices the dinner was given. Miss Law received among other things a check for $2,500 in recognition of her record flight, and a gold watch, suitably engraved, will be forwarded to Mr. Carlstrom.

F. E. Diffen, representative of the Erie (Pa.) Board of Commerce, announced that the Erie Board of Commerce, which has been establishing an aeroplane station at Erie, will give $10,000, to be expended by the Aero Club of America in the Trans-continental Aeroplane Contest, for which the club has already set aside a first prize of $20,000.

Among those sitting at the guest table were Rear Admiral Robert E. Peary, discoverer of the North Pole, who was toastmaster of the evening, and Mrs. Peary; Captain Roald Amundsen, discoverer of the South Pole, who expects to use aeroplanes in his expedition to the North Pole; Captain Robert A. Bartlett, explorer, who was the commander of the Roosevelt and who took an active part in Peary's expedition to the pole; Alan R. Hawley, president of the Aero Club of America; Henry A. Wise Wood, chairman of the Conference Committee on National Preparedness; Major Carl F. Hartmann, commanding officer, Signal Corps, Eastern Department of the United States; Commander R. K. Crank, U. S. N., in charge of the Recruiting Department for the Northern Part of the United States; Mrs. Douglas Robinson, sister of Theodore Roosevelt, who read a special poem dedicated to Miss Law, entitled "Flying;" Mr. and Mrs. H. P. Davison, Miss Eleanor Gates, Charles Oliver, Representative Murray Hulbert, Henry Woodhouse, governor of the Aero Club of America; Beatrice Forbes-Robertson, and the following members of the First Unit of the Aero Coast Patrol:—F. Trubee Davison, Albert J. Ditman, Wellesley L. Brown and Earl C. B. Gould.

Major General Leonard Wood was called to Washington to appear before the Senate Committee on Military Affairs and sent regrets that he could not be present.

Mrs. William H. Bliss, who presented the first aeroplane and a course of training for two officers which made it possible to organize the First Aero Company, New York National Guard, was also present with Mr. Bliss. At their table were also Mr. and Mrs. Pomeroy, who contributed an aeroplane to the Aerial Coast Patrol Unit No. 1, which was organized with the co-operation of Mrs. Davison, and of which her two sons, F. Trubee Davison and H. P. Davison, Jr., are members. Harry Bowers Mingle, president of the Standard Aeroplane Corporation, who presented an aeroplane to Captain Roald Amundsen to be used in his next Arctic expedition, was also present, and discussed with Captain Amundsen the features of the aeroplane which is to be used for the expedition.

Lieutenant V. D. Herbster, United States Navy, aviator, who recently returned from Berlin, where he was connected with the embassy for two years, and who is an authority on rigid dirigible balloons, Captain J. E. Carberry, Glenn L. Martin, Edw. M. Hagar, Charles Jerome Edwards, K. M. Turner and other well-known men in aeronautics were also present.

NEED AT HAND FOR AERIAL TERMINAL

Excerpts from the Address Delivered Before the American Civic Association by Henry Woodhouse, Appointed Delegate to the A. C. A. Convention by Governor Charles S. Whitman of New York.

THE time has come when every city must establish aerodromes, terminals where aircraft carrying passengers and merchandise can land.

Considering that we have aeroplanes capable of travelling at a speed of 135 miles an hour, others capable of lifting 15 tons, and that developments in aeronautics proceed at a wonderful pace, we must admit that the aerodrome is as logical an institution in a city as the railroad station, and may become as crowded as the average railroad station within 10 years. It all depends on how fast aerodromes are established throughout the country, because aerodromes are to the aircraft what the rail is to the train and the good road is to the automobile, as ports are to ships.

The censor may forgive me for telling of two flights made recently in England, which give an idea of the nature of the developments that are taking place in aeronautics.

In one case a large flying boat of American make, with a wing span of more than 130 feet and equipped with 1,000 h.p., flew with 8 passengers and 600 gallons of gasolene on board. Its speed was more than 70 miles an hour, and the 8 passengers sat in an ample cabin, protected from the elements. The other case was a flight made in a huge land aeroplane carrying 21 passengers, which rose to 7,000 feet.

No storm could trouble an aircraft of such weight and size, while their enormous carrying capacity makes it possible to carry fuel for long flights.

Air Liners of the Future

We are drawing near to the time when we shall have air liners. How soon will they come? As soon as somebody places an order for them. We have the engineers to build them, large reliable motors to drive them, instruments to operate them, the aviators to pilot them. There are also financiers ready to finance the establishing of air lines and operate scores of these huge air liners, but they have not the time or the technical knowledge at present to combine these factors and establish and operate these air lines. But we may soon expect to see financiers, business men and aeronautic experts co-operating to solve this problem.

As a matter of fact, aeronautic problems never remain long unsolved. It is only thirteen years since the Wright brothers made the first aeroplane flight ever made, and thereby took the word "impossible" out of the dictionary. That first flight was made by the Wright brothers on December 17, 1903; the first public flight was made by Alberto Santos-Dumont, who is now president of the Pan-American Aeronautic Federation, in 1906; the first aeroplane flight at a height of 100 feet was made by Wilbur Wright in France on August 8, 1908; the first aeroplane for military purposes was ordered by the United States army in 1908; the first employment of an aeroplane under conditions approximating warfare was in the early part of 1911, at the Mexican border, with an aeroplane loaned by the president of the Aero Club of America; the first actual employment of aeroplanes and dirigibles in warfare was in the Italian campaign in Tripolitania, in the fall of 1911; the first successful hydroaeroplane flight was made by Glenn H. Curtiss on January 26, 1911.

Milestones in Aviation

These few events, which stand as milestones in the history of the progress of aviation, give an idea of the remarkable speed in which progress in this science has taken place.

The non-stop record flight is twenty-four hours, twelve minutes; the altitude record is 26,260 feet, which is higher than Mount McKinley; the speed record for one hour's flight is 123 miles an hour; the hydroaeroplane, which only made its first flight in 1911, has grown into an air cruiser capable of lifting fifteen tons. And whereas efficient aeronautic motors weighing less than ten pounds a horsepower did not exist ten years ago, we now have not less than fifty different types of good aeronautic motors, weighing between two pounds and four pounds to the horsepower, including quite a selection of motors of between 350-horsepower and 400-horsepower.

Likewise, whereas one of the cardinal problems in 1911 was to find a way to stabilize the aeroplane, today we have not only inherent and mechanical stability, but we actually have devices which practically relieve the pilot of all work of operating the aeroplane in flight.

A Glance Into the Future

In city planning, provision should be made to establish a number of landing places for aeroplanes on land and water. Every city and town wishing to keep up with progress will soon have to have landing places for aeroplanes, and within ten years the number of landing places may have to be quite numerous. Aerial transportation in the near future is to be tranportation between cities and places more or less like rail and boat transportation. In time aircraft will be developed that may easily land in streets, or changes in the make-up of cities will make it possible for aerial travelers to land in terminals located in central places in cities.

Aerodromes will be very much like the railroad stations of today, insofar as their equipment to serve the public is concerned. Taxis will be there to meet arrivals just as taxis meet trains. One reason why aerodromes should be within cities is that otherwise it may be found that it takes less time to come from Philadelphia or Albany to New York, for instance, than to cross the city of New York in a taxicab or street car after arrival.

Considering the service stations for aerial travelers at the aerodrome brings out the fact that in traveling in an aerial limousine there will be less general discomfort than there is today in a train. And there will certainly not be any smoke, coal dust or other unpleasant details. The one objectionable feature of the present day aeroplane is the roar of the motor. But mufflers are now being developed, and I dare say that the noise of traveling aeroplanes may be far less within five years than the noise of the trains which one hears on Riverside Drive and other places near railroads at night.

For the time being and for a few years to come aerodromes will essentially be flat, open fields, between 200 and 500 acres in size, with hangars, repair and supply shops, etc.

For National Defense

And that reminds us that today aircraft, by making every place an aerial port, also makes it almost imperative to have anti-aircraft defences for every place. We know that all the large cities of the warring nations now find it necessary to have anti-aircraft defences, which consist of anti-aircraft guns, armed aeroplanes, searchlights, listening towers and wireless stations. There are not less than four hundred armed aeroplanes, and anti-aircraft guns within a radius of one hundred miles of London
of photographs of anti-aircraft units of different countries, including some showing the units rushing through the streets of a city shooting at aircraft which are dropping bombs on the city. Other photographs show the aeroplanes and dirigibles shot down by the anti-aircraft units.

It is all part of that awful drama which is shaking the foundation of the world. We will not consider this drama here further than is necessary to bring out the fact that aerodromes are needed for the defence of cities. I have flown over New York city at a height of five thousand feet and it makes me shudder to know that it is utterly unprotected from aerial attacks, which would be made by aeroplanes starting from ships at sea, beyond reach of our guns. Proper defences against air raids would cost less than the damage of a single bomb dropped on that metropolis.

New York from Above

Most present-day cities look illogical from the air. Even the greatest of cities, like New York, Chicago, London, Paris and Berlin, do not look very great from the air. New York is the only city which comes near looking like a city from the air. From a height of 5,000 feet it looks like a city of wonderful toy buildings, the buildings being high enough to stand out in evidence. From that height on a clear day the metropolis is an inspiring sight. The tallest of the buildings glitter in the sunlight and around the city on the rivers the ships look like very tiny toy ships, traveling slowly over the dark waters, leaving a white wake. The bridges look like only frail structures across tiny rivers. Coming a little lower, one sees down the straight narrow cracks between rows of building which we call streets, tiny moving objects—the trains on the elevated railroads, street cars, automobiles and other vehicles. That is briefly, New York from the air.

Aerial transportation will lead to beautifying the tops of cities and towns. Very few cities could pass an aerial inspection in that respect. The roofs form a very unattractive sight.

Who Will Do This and When?

These questions will be asked as soon as people realize the inner meaning, the wonderful influences which the development of aerial navigation will bring about.

The answer can be found daily in the press. We are doing it now. Ruth Law and Victor Carlstrom, by flying from Chicago to New York, and many others who have been making flying an everyday matter, are doing pioneer work, and so are the postal authorities and dozens of other officials, including Lieutenant Colonel George O. Squier, Howard E. Coffin and Henry B. Joy, who proposed and are working with the Aero Club of America and others to establish the Lincoln Air Way.

Post Office Plans Regular Mail by Aeroplane

REGULAR aeroplane mail service between New York and Chicago is being considered by the Post Office Department. The announcement was made that the plan was regarded as practicable and might be established with part of the proposed $100,000 postal appropriation for experimental aerial service.

Department officials estimate that the flight of 720 miles could be made in from six to fourteen hours, with an average time of eight hours, and a load of from 500 to 1,000 pounds of mail. Flying would be at night, a plane leaving each city at 6 P. M., alighting at three regular stations, near Williamsport, Pa.; Niles, and Napoleon, Ohio, where extra machines, fuel and equipment parts would be maintained. At Niles a second machine would be taken on relay. Eventually emergency alighting stations might be established every twenty-two miles, each equipped with powerful guiding lights.

The postal authorities suggest that letters dispatched before 6 o'clock at either New York or Chicago would be delivered normally before 9 o'clock the following morning, but under the best conditions and with special messenger service might be delivered soon after midnight.

The announcement of the plan was received with enthusiasm in aeronautical circles, and the general opinion was that it was practicable.

Discussing the proposal as an experienced aviatrice, Miss Ruth Law, who made the record flight of 8 hours 55 minutes and 35 seconds from Chicago to New York, said:

"I hope that Congress will appropriate the money so that the actual possibilities of aeroplane mail service may be determined. I believe that such a service between New York and Chicago, although it would encounter many difficulties, could be made to work. I understand, however, that the plan proposed contemplates night flying, and I must criticize it in this point. The difficulties of maintainng a day service would be sufficient. Why increase them to the point of disaster by attempting a night service?

"I have done enough night flying to know what it is, and I can say emphatically that a night service between New York and Chicago at this time is not possible. The single question of emergency landings would present an insolvable problem. But if the flights were attempted in the day time with proper arrangements I believe that the service might be developed to real utility."

Henry Woodhouse, a member of the Board of Governors of the Aero Club, who has worked for the establishment of airplane mail service, was enthusiastic over the announcement. He said:

"The plan of the Post Office to establish a regular aeroplane mail service between New York and Chicago is progressive, will be of value for the purpose of training aviators for national defense, and is practical in every way. If Congress will appropriate the $100,000, the monetary problem which has blocked previous attempts to establish an airline mail service will be solved.

The Pan-American Aeronautic Exposition

ADVANCE work preparatory to the first Pan-American Aeronautic Exposition, which will be held in the Grand Central Palace from February 8 to 15, is progressing most satisfactorily, and, aside from all the space on the ground floor being subscribed for, additional space above will be filled with exhibits of accessories and motors.

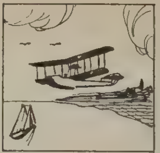
Howard E. Coffin has just returned from Washington, D. C., where he has been engaged in arranging for the exhibit of the government at the exposition, and he expects Uncle Sam to have a most interesting and instructive exhibit.

Henry B. Joy will have a model of the Lincoln Aerial highway on exhibition, and the Goodyear army kite balloon, as well as the first Wright machine, will be among the other interesting exhibits, but the most unusual of all will be the model of an aircraft made by A. Niflot, who designs the fire department's charts of call boxes.

Mr. Niflot has followed the description of an aircraft as

(*Continued on page* 394)

The News of the Week



War Department Buys 1,700 Acres for Aero Field

The War Department has purchased about 700 acres of land on lower Chesapeake Bay near Fort Monroe for an aviation field. The price paid was $290,000, appropriated by Congress at the last session. Officials estimate that $1,500,000 will be asked of Congress for buildings and equipment, to make it one of the foremost stations of the kind in the world.

The tract is between Back River and Hampton, Va., is flat and possesses all the characteristics, army aviation officers believe, that are necessary for a first class proving ground. The station probably will be named "Langley Field," in honor of Professor Langley, the first official of the United States Government to make experimental flights with heavier than air machines.

Lieutenant-Colonel George O. Squier, chief of the army aviation service, said that work will begin on the necessary and possible improvements in the near future, and an effort to get Congress to act on the additional appropriation is expected after the holidays.

General Scriven in His Report Urges Separation of Aviation from Signal Corps

The eventual separation of the aviation section from the Signal Corps of the United States Army is approved by Brigadier General George P. Scriven, chief signal officer of the army, in his annual report to the Secretary of War, which was made public recently, according to press statements.

Following a general resume of the progress made in military aviation in the last year the report tells of the plan to organize seven aero squadrons of the regular army, twelve squadrons for the National Guard division and five for the defences of both coasts, besides aerostatic units for the mobile army and coast artillery.

General Scriven speaks of the smallness of the signal corps and then says:

"It is becoming increasingly evident that the system of detailing officers from the line for periods of service, frequently short, is as vicious as it is archaic, and should be changed."

Army Flight to Philadelphia Postponed

On account of the weather conditions the proposed flight of fifteen army aeroplanes that were to have flown to Philadelphia December 16th, was postponed. The officers to make the flight were to be: Captain J. E. Carberry, Capt. W. G. Kilner, Capt. R. C. Bolling, Lieut. J. E. Miller, H. Salmon, Lieut. Norbert Carolin, Capt. R. L. Taylor, Lieut. D. Osborne, Lieut. Howard Wehole, Averton Bounds, P. C. Millman, A. L. Allan, H. Blakeley, H. B. Baker and Charles Reed.

Luncheon to A. Leo Stevens

The officers and members of the Aero Club of America tendered a luncheon to Mr. A. Leo Stevens to congratulate him upon his appointment to the aerostatic station at Fort Omaha. Mr. Alan R. Hawley, president of the Club presided, and in most appropriate terms complimented the guest of the occasion. Mr. Charles Jerome Edwards, Henry Woodhouse, Augustus Post, Roy Knabenshue, Harry L. Barnitz, Frank Goodale, and W. H. Gash were amongst the other speakers who took occasion to endorse Mr. Stevens' appointment.

In acknowledging the greetings, Mr. Stevens assured the members of the Club that he would do everything he could to upbuild the aerostatic arm of our aerial defenses.

Aerial Age joins with Mr. Stevens' friends throughout the country in wishing him Godspeed and all success in his new undertaking.

Richardson Aeroplane Co. to Build Factory

It is reported that the Richardson Aeroplane Corporation, New Orleans, La., a company recently organized with a capital stock of $500,000, will build a large plant in New Orleans.

F. T. Richardson, former purchasing agent for the Texas and Pacific, is president of the new aircraft corporation. He says the factory will be equipped with facilities for manufacturing aeroplanes of the latest type.

Aeroplane Factory at Newark

Feist & Feist, Inc., have rented a factory in Meadow street, Newark, to the Witteman Aircraft Company, manufacturers of aeroplanes.

Erie Station on Transcontinental Route?

If a suggestion before the Chamber of Commerce of Erie, Pa., is favorably acted upon, Erie will be one of the official landing places on the transcontinental air route next spring. Binghamton, N. Y., was the first city to come in line, and Erie promises to be the second.

Pilots Carl Batts and W. G. Schauffler, Jr., who flew from the Atlantic Coast Aeronautical Station, Newport News, to their Thanksgiving dinner at Hampton, Va. Right to left: J. Philip Reisiker; Carl Batts; Miss Rachel Rouzer; Miss Leonora Rouzer, of Orange, N. J.; W. G. Schauffler, Jr.; Mrs. Rouzer, and Lieut. Saxer, U. S. N.

Pershing Lauds Air Scouts

Striking demonstrations of the value of aeroplanes in the last field manœuvers brought forth the declaration by General Pershing that he would rather have an aeroplane than a regiment of cavalry for reconnaissance work. The admirable work of a motor truck train in transporting infantry to threatened points also brought warm commendation.

Manœuvers involved an attempt to ford the Casas Grandes river at one of three points. These fords, three miles apart, were defended by infantry, field artillery and cavalry. The defenders also had the use of a truck train of twenty-seven cars. Each side had one aeroplane.

Erie's Head Favors Aerial Mail Route

If the Post Office Department establishes an aerial mail route between New York and Chicago the Erie Railroad will co-operate to the fullest possible extent. Frederick D. Underwood, president of the Erie, has stated that his company would be willing to provide landing places on railroad property at points to be decided later and would furnish searchlights as guides every twenty miles, if necessary.

The route of the Erie has been the natural route for aviators since the first Chicago-New York flights were attempted, partly because of the favorable air currents and partly because of the chain of rivers which act as guides to the aviator too high in the air to see other distinguishing marks. Ruth Law, on her recent flight, complained that the aerial map helped her little and that she was guided chiefly by the rivers.

"We will be glad to aid such a project in any way if we are asked," said Mr. Underwood, who has always been greatly interested in aviation. "It is a public enterprise. We are not altogether altruistic, for we get a good deal of Chicago mail ourselves and we ought to get it quicker if this plan is a success."

Aero Club of Penna. Elects Officers

At the December meeting of the Aero Club of Pennsylvania, held in the Bellevue-Stratford, on the evening of the 15th, the following nominations for officers for the ensuing year were made: president, Joseph A. Steinmetz; 1st vice president, N. D. Harris; 2nd vice president, A. J. Drexel Biddle; secretary, George S. Gassner; treasurer, L. Maresch; directors, H. F. Bamberger, H. H. Knerr, H. Von Figyelmessy, C. P. Wynne, R. Moscau, A. Bournonville and L. S. Clarke. The anuual meeting of the club and election of officers will be held in the Bellevue-Stratford, on the evening of January 19th and a large attendance of members is earnestly requested.

N. S. Hopkins with Atwood Aeronautic Co.

The Atwood Aeronautic Company, of Williamsport, Pa., has recently secured as general manager, Mr. Nelson S. Hopkins, who until recently was with the Curtiss Aeroplane Co.

Mr. Hopkins had previously been connected with the American Locomotive Co., at the A. L. C. O. plant at Providence, R. I., and with the Sterling Engine Co., of Buffalo, N. Y.

Export of Aeroplanes

The export of aeroplanes and parts since our last report has been as follows: To Great Britain $71,660, to Norway $912, to Siam $114, to Bermuda $32; total $72,718.

New Biplane for Miss Ruth B. Law

Miss Ruth Bancroft Law has ordered a new aeroplane from Glenn H. Curtiss with which to defend her title as champion cross country flyer of America, but the machine will possess a decided utilitarian value as well, for, as Miss Law says, she is after an aeroplane "of the kind that can make flights to Chicago on a moment's notice. The kind of machine in which some person anxious to get to Chicago more rapidly than the Twentieth Century Limited would take him might resort to with safety."

This new Curtiss biplane, which will have its trial in about a month, will have a full capacity, sufficient to keep it in the air for ten hours, and will have a speed of at least one hundred miles an hour.

National Advisory Committee for Aeronautic Meets

At the regular monthly meeting of the Executive Committee of the National Advisory Committee for Aeronautics, December 7th, the committee adopted the Metric System as its standard, so far as the work of the committee is concerned, and recommendations will be sent to the various departments of the Government that this system be adopted in connection with all matters pertaining to aeronautics. The War Department will put this change into effect immediately in its Aviation Section, using both the Metric and English systems on all drawings for a time.

It has been found necessary to amend and add to the nomenclature for aeronautics recently issued by the committee. The following changes were adopted at the meeting and will be incorporated into the report on nomenclature when published in the Second Annual Report:

The question of what is a right-hand engine has occasioned a great deal of comment in the aeronautic industry, and in order to associate the words "right-hand" and "clockwise," the definition of a right-hand engine has been amended to read:

"A right-hand engine is one in which, when viewed from the output shaft, looking toward the output shaft end, the shaft is seen to rotate clockwise."

As it appeared necessary, on further consideration, to differentiate between aircraft designed for operation from land and those designed for operation from water, the committee adopted the term "seaplane" for aeroplanes in which the landing gear is suited to operation from the water. The term "aeroplane" is commonly used in a more restricted sense to refer to machines fitted with landing gear suited to operation from the land.

For "Dihedral in an aeroplane" the committee adopted the following definition:

"The angle included at the intersection of the imaginary surfaces containing the chords of the right and left wings (continued to the plane of symmetry if neccessary). This angle is measured in a plane perpendicular to that intersection. The dihedral of the upper wing may, and frequently does, differ from that of the lower wing in a biplane."

The resignation of Naval Constructor H. C. Richardson, U. S. N., as secretary of the committee, on account of his transfer to duty at the Navy Aeronautic Station, Pensacola, Florida, as construction officer, was accepted to take effect this date. Pending the election of a permanent successor, Dr. S. W. Stratton, Director of Bureau of Standards, was appointed temporary secretary.

Army and Navy Orders

First Lt. Albert L. Sneed, 7th Inf., to Ft. Sam Houston, for examination for detail in aviation section Signal Corps.

Sergt. 1st Class Charles R. Schreiber and Sergt. James McFadden, S. C., are relieved further duty with 1st Aero Squadron, Signal Corps, Columbus, N. M., to Fort Sam Houston, Texas, 3d Aero Squadron, Signal Corps, that station, for duty. (Nov. 27, S. D.)

Capt. Shepler W. Fitzgerald, junior military aviator, Signal Corps, to Mineola, L. I., and report to commanding officer, Signal Corps aviation school, for duty.

Lt. (J. G.) G. B. Strickland, detached works Curtiss Aeroplane Co., Buffalo; to naval aeronautic station, Pensacola.

Personal Pars

Edward Bellande, of Ocean Springs, Miss., a student at the Curtiss School at Newport News, has secured his pilot's license. He is only nineteen years of age.

Aviator J. J. Grady, accompanied by Loyd L. Beard, Chicago's "Prince of Ragtime," flew from Chicago to Fort Wayne, Ind. The distance between these cities is 124 miles, and the time consumed by the birdmen was 100 minutes, although somewhat hindered by a faulty propeller. Grady, one of Chicago's pioneer designers, uses a Curtiss type tractor constructed by himself, and equipped with his especially designed Grome motor. Mr. Grady expects to better his time on a duplicate trip the coming Sunday if weather permits.

Fred E. Goodall, designer and constructor of aeroplanes, has completed a new speed-scout, which he intends to enter in the cross-country tournament next summer in the United States and South America.

E. B. Heath, the veteran aeroplane builder, contemplates opening a new factory in Chicago to continue the manufacture of machines which was interrupted by the burning of the Heath Aerial Vehicle Plant, on School street, some weeks ago.

Louis Gertson flew at the National Farm and Livestock Show in New Orleans, November 11 to 19 inclusive. He created a sensation with his looping at night amongst fireworks. Gertson was highly congratulated by a delegation of business men from South America, after one of his many night flights.

Aviator Harvey M. Harold recently visited New York after the completion of a successful exhibition trip with his Bleriot monoplane through the South. Harold will spend the winter in California.

Mr. Roy Knabenshue, formerly with the Wright Company, is now general manager of the company that will commercially develop the Martin aerodynamic stabilizer, invented by Capt. James V. Martin.

Leonard W. Bonney recently tested the twin-motored hydroaeroplane of the New York Aero Construction Company. The machine is equipped with two Aeromarine motor and handles very easily.

Leo Stevens took up his duties at Fort Omaha, December 15.

Charles F. Kirkham, one of our pioneer aero motor designers, now a member of the engineering staff of the Curtiss Aeroplane and Motor Corporation.

Capt. Phil Billard flew from Topeka to Kansas City in forty minutes Thanksgiving afternoon. He was accompanied by Courtney G. Elliott, of the Aero Company National Guard.

Aviator Bjorklund has recently been making tests of the Gallaudet hydroaeroplane.

John Maulbetsch, captain of the University of Michigan football eleven which just closes its season, has become an enthusiastic aviator. He has made flights with Don McGee, of Saginaw, brother of Red McGee, the Detroit baseball club's catcher, and seems anxious for more opportunities to buck the air.

Dr. P. B. Peterson, of Honesdale, Pa., has received a letter from his son, David, stating that the latter has joined the French aviation corps. He is now securing his training. Young Peterson was employed at the Curtiss plant in Buffalo before going to France.

"Red" McGee, catcher for the Detroit Americans, has a brother who is an aviator. The latter, whose name is Frank, recently tuned up his aeroplane at Saginaw and decided to sail above Ann Arbor to watch a Michigan football game. He not only made the trip and saw the game, but entertained the crowd with daring feats between periods.

THE BARLOW AERIAL TORPEDO

The United States has now in its possession an aerial torpedo destined to mark a great advance in modern warfare. The chief point about the new engine of destruction is that it explodes at a given height above the ground, permitting the force to travel horizontally. All other attempts at firing shells at predetermined heights have been failures. The inventor of the new shell is Lester Barlow, a young man, who perfected his invention under the auspices of the United States Government, and served as chief engineer under General Villa, when Villa and Carranza fought side by side to crush the government then existing in Mexico.

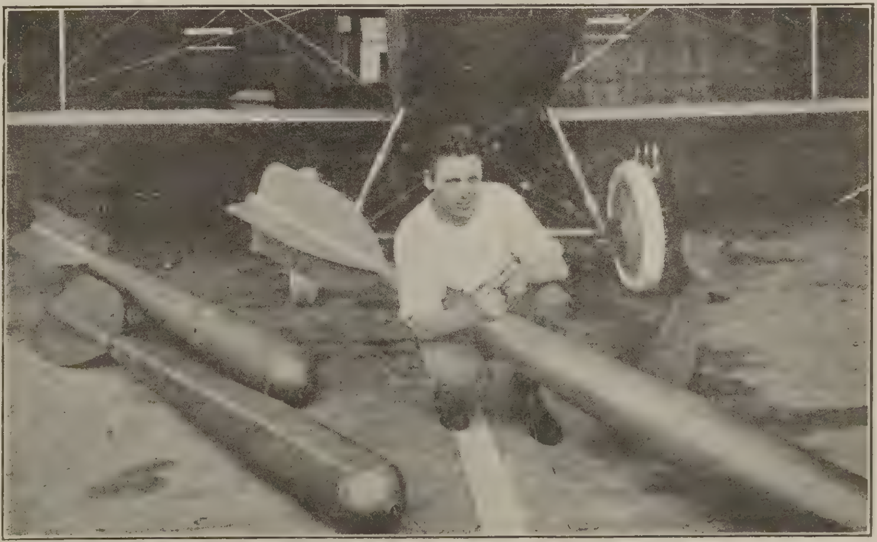
Barlow's torpedo was tested by the United States Government at Mineola, L. I., early in September. The report of the Army Ordnance Board signed by Lieutenant-Colonel C. H. L. Ruggles, Ordnance Department, says: "The Barlow aerial torpedo is satisfactory. The action certain, the flight true, and the safety devices satisfactory."

The tests of September 6 and 7 were witnessed by Lieutenant T. S. Wilkinson, U. S. N. Those of the 6th, 7th and 8th by Captain E. J. Ragsdale, Ordnance Department, and all by Lieutenant-Colonel G. G. Gatley, Ordnance Department.

The torpedo was dropped from 2,000, 3,000, 4,000, 5,000, 6,000 and 7,000 feet. In two of the tests light charges of high explosives were used —full charges would have endangered the community. The light explosive charges shook homes three and four miles away.

The new torpedo is seven and a half feet long. Its weight is one hundred pounds. It has a stream line to eliminate friction, thus ensuring the greatest possible speed between aircraft and target. Other shells of this character have been built to fall as slowly as possible to allow the mechanism time to work and explode the torpedo at a given point. The tests at Mineola showed that the Barlow torpedo will explode accurately to the inch of the point it is set to detonate. The aviator had nothing to do with the timing of the shell. It is automatically timed to explode at a given point, no matter from what altitude it is dropped.

The torpedo is carried attached horizontally beneath the aeroplane in traps, and is released by the moving of a small lever when the cross-wires in sighting apparatus designate the proper position. The torpedo sets itself after it has fallen three hundred feet. Before being released, it is absolutely non-explosive. In addition to the charge of high explosives it is capable of carrying one thousand cubic feet of poisonous gases.



The Barlow aerial torpedo.

FLYING FROM SMALL FIELDS

By J. G. Gilpatric

IN this day of lawn-like aerodromes covering entire square miles of flat country, it is seldom necessary for aviators to pay much attention to their fields. Cross-country pilots—ever facing the possibility of a forced landing on unfamiliar ground—should be capable of "playing" a field, and the day may come when war will necessitate constant work from makeshift aerodromes in hilly or wooded country. Nothing is more unpleasant than a small field with trees or houses at the boundaries, especially if one is flying with heavy loads.

There are three general classes of fields: the aerodrome, in which one can work in every direction; the "two-way" field, and the "one-way" field. The aerodrome, of course, requires no attention, as the aviator can always start and land dead into the wind. The "two-way" field, however, is long and narrow, and unless the wind is blowing parallel to its longest dimension the pilot will have to contend with side winds. The "one-way" field is also too narrow to permit starting or landing across it, and in addition has trees or other obstructions at one end so that the pilot will have to start and land in opposite directions. That is, if he starts against the wind, he will have to land with it.

Before attempting to work from a small field, the pilot should walk over every inch of the ground, and figure out its various possibilities. It is always a good plan to look over the adjacent country, and to try to find fields sufficiently large to permit a forced landing if the field originally selected is "hard to hit" from certain angles. If the surrounding country is wooded or hilly, it is always well to figure what the air will be like during the getaways and landings. Once in the air the pilot should keep within safe gliding distance of the field. Remember that it is easy to "kill" distance and height, but that one can't create them; that is, it is safer to overshoot the field, and kill the superfluous height by an extra turn in a spiral, or by nosing down steeply, than it is to fall shy of the field altogether. Always have height to spare.

When many pilots are starting toward some high obstruction which must be cleared, it is their custom to "drag" the machine into the air, and force it to climb. Their whole idea seems to be to clear the obstruction and to forget everything else. As a matter of fact, when one is starting toward trees, houses, etc., and when the available starting distance is limited, he should take an unusually long run on the ground before lifting the machine. In this way, the machine will make a clean getaway, and have sufficient speed to handle well should a sharp turn be necessary. It is far better to "shave" an obstacle, and leave the machine plenty of excess speed, than it is to clear by a considerable distance with the tail dragging and the controls gone "soggy." Most machines climb efficiently at speeds far above the stalling point, and usually there is a distinct loss when the tail is dragged. All of which points out the need for accurate air speed indicators on all aeroplanes, in order that pilots can see at a glance whether the machine is at its best climbing speed.

When flying from one and two-way fields, it is frequently necessary to land in side-winds. Some machines drift very badly under these conditions, and the result is often a side-swiped chassis and a smash. Pilots have various methods of checking landing drift, although some disregard it altogether and plough into the ground in a distressing manner. The method generally used is one which good pilots employ unconsciously, and which consists of using slight rudder and aileron against the drift. The amount of control used should not be sufficient to actually turn the machine into the wind, but just enough to permit the turning *tendency* to balance the drift.

A method for side-wind landings, originated by the writer, is as follows: Descend at fairly high speed *into* the wind.

(*Continued on page* 387)

AERO ENGINE DETAILS

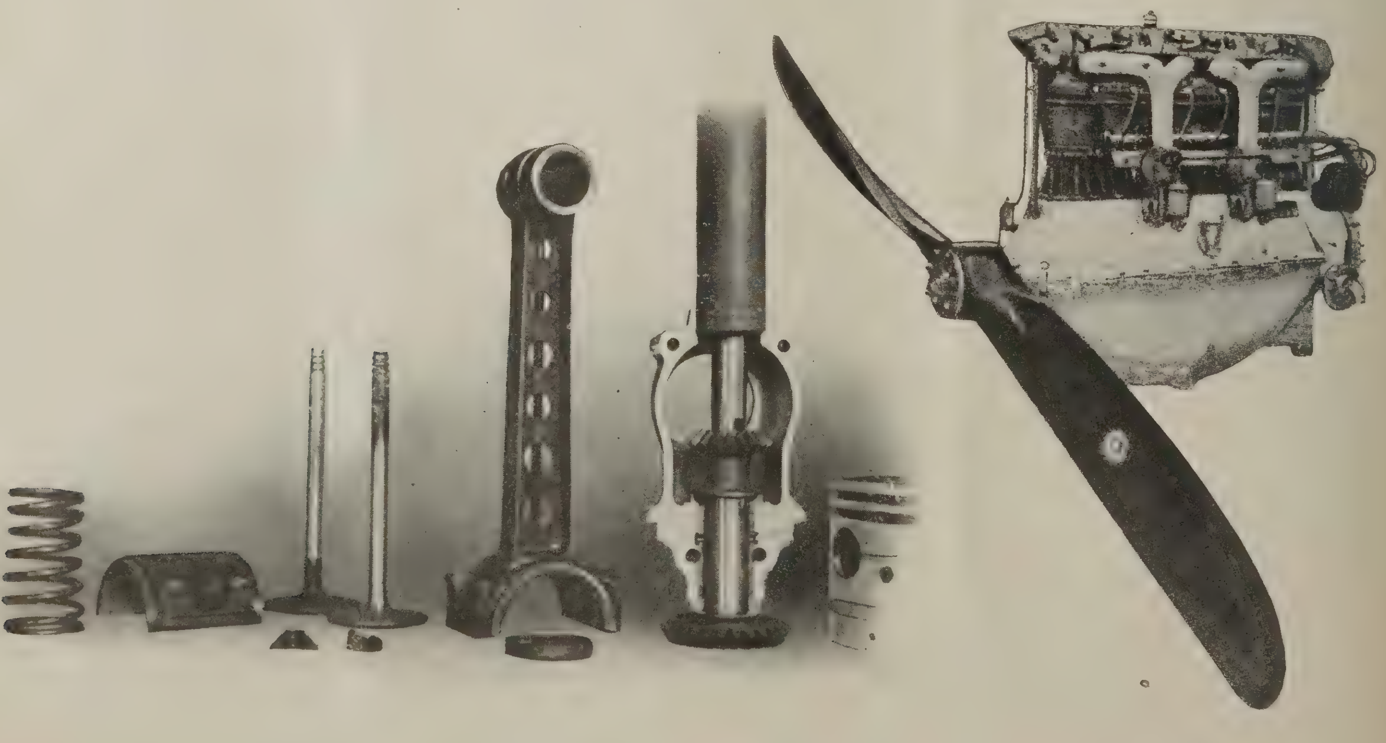
ADDITIONAL information about Italian motors, the photographs of which were published in AERIAL AGE recently, is given by Mr. Harold D. Kantner, the veteran aviator and motor expert, as follows:

The Fiat gives 104 h.p. at 1,400 r.p.m., has 120 millimeters, bore and 140 millimeters stroke; weighs about 400 lbs. The cylinders are of steel, Mercedes method of construction and turned inside and outside. The exhaust valves and intake seats and cages are drop forged and machined inside and out. They are let into holes bored in the cylinder head and welded from the outside. The welding is so well done that it does not even show. High pressure oil system.

The Colombo gives 110 h.p. at 1,400 r.p.m. Has a 120 millimeter bore and 160 millimeter stroke; weighs a little under 400 lbs. Has cast iron jacket over cylinder heads, the cylinder wall being surounded by a sheet steel jacket.

The Isotta-Fraschini gives 150 h.p. at 1,400 r.p.m.; has 130 millimeters more, 180 millimeters stroke, weighs about 600 lbs. without radiator or water. Use cast iron jacket over the cylinder head, and cylinder walls are surrounded by sheet steel jacket.

Motors are now being armored so that shots may not penetrate a water or valve mechanism.



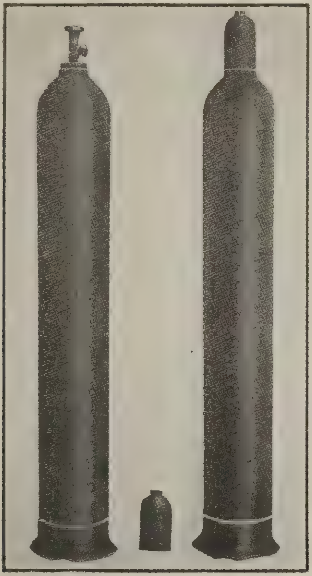
OXYGEN AND HYDROGEN CYLINDERS

By Joseph A. Steinmetz

IN wartimes it is usually not possible to make hydrogen in the field with the mobile units, hence the balloon gas is brought from the base in seamless steel shipping cylinders, each fitted with a pressure valve and a safety cap to prevent the valve being opened or damaged during transport.

These seamless steel containers are known to the world of trade and commerce as "oxygen cylinders" and in the United States there are more than one million in service, for use with acetylene in the art of oxy-acetylene cutting, welding and fusions of metals.

The same cylinder is used for hydrogen and differs only in that the outlet connection is threaded left hand for the hydrogen service and right hand for oxygen, so arranged to prevent explosions or misuse by ignorant connection to the incorrect gas pressure head.


Total height of cylinder with cap on, fifty-nine inches.

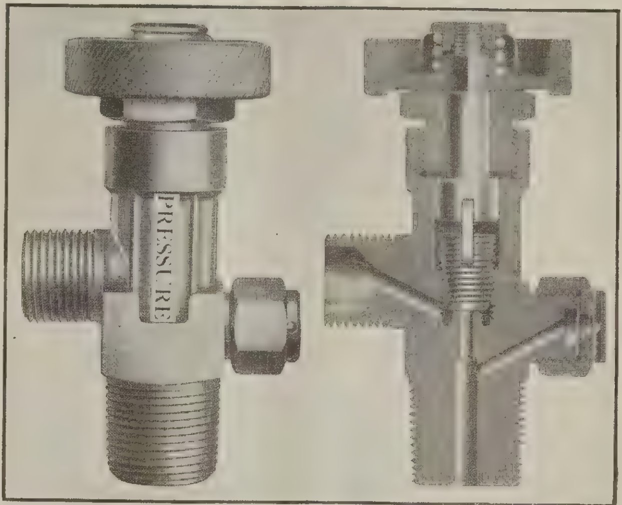
For emergency field balloon service it would be entirely proper to use standard oxygen valves with regular valve connections as the service would be distinct and definite without danger of intermingling explosive gasses in combination.

The vast majority of seamless gas cylinders in America are designated "Oxygen model 200 cubic foot capacity." The size of this standard container is 8½ inches inside diameter, about 9¼ inches outside diameter and a body length of 51 inches.

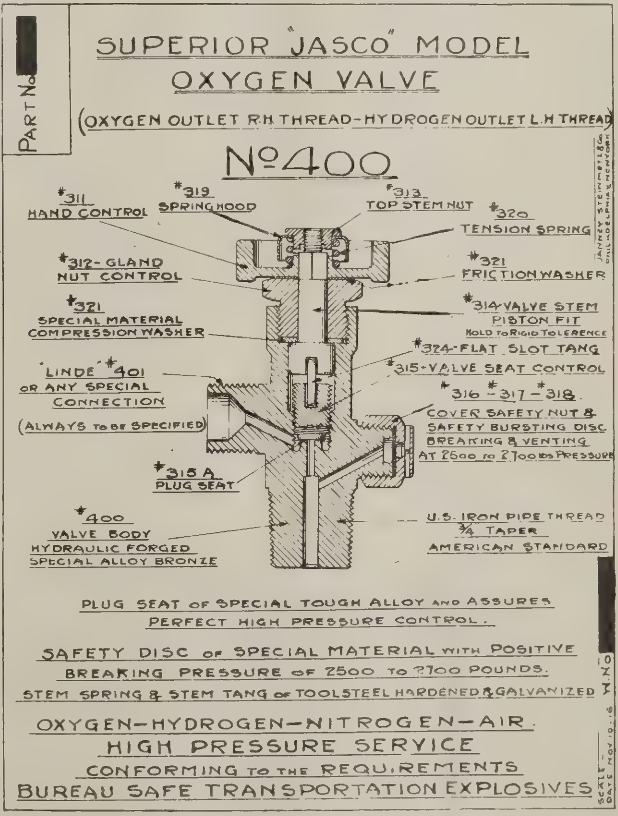
This gives a capacity of about 2700 cubic inches of water, and at 1800 lbs. pressure will hold 200 cubic feet of hydrogen and at 2000 lbs. would equal about 250 cubic feet of balloon gas.

It is generally accepted that Germany has nearly five million such hydrogen cylinders in war service, carried in tiers on special trains to speed from base to base to inflate Zeppelins and kite balloons, returning the empty cylinders to the hydrogen compressor plants for refilling.

The cylinders described weigh about 150 lbs. filled with gas and fitted with valve and protector cap, and are worth complete per unit about thirty dollars. On this basis, the weight, size, capacity and cost of cylinders for balloon units of any given problem may be instantly calculated.



The packing nut, spring nut, stem and plug are made of high-grade brass. Stem spring and stem tang are tool steel, hardened and galvanized, thus preventing any possible corrosion. Plug seat is a special, soft, tough alloy and assures a perfect seat.


PART No
SUPERIOR "JASCO" MODEL
OXYGEN VALVE
(OXYGEN OUTLET R.H. THREAD–HYDROGEN OUTLET L.H. THREAD)
No 400
*311 HAND CONTROL
*319 SPRING HOOD
*313 TOP STEM NUT
*320 TENSION SPRING
*312- GLAND NUT CONTROL
*321 FRICTION WASHER
*321 SPECIAL MATERIAL COMPRESSION WASHER
*314 VALVE STEM PISTON FIT HOLD TO RIGID TOLERENCE
*324-FLAT SLOT TANG
"LINDE" *401 OR ANY SPECIAL CONNECTION (ALWAYS TO BE SPECIFIED)
*315-VALVE SEAT CONTROL
*316-*317-*318. COVER SAFETY NUT & SAFETY BURSTING DISC BREAKING & VENTING AT 2500 TO 2700 LBS PRESSURE
*315 A PLUG SEAT
*400 VALVE BODY HYDRAULIC FORGED SPECIAL ALLOY BRONZE
U.S. IRON PIPE THREAD ¾ TAPER AMERICAN STANDARD
PLUG SEAT OF SPECIAL TOUGH ALLOY AND ASSURES PERFECT HIGH PRESSURE CONTROL.
SAFETY DISC OF SPECIAL MATERIAL WITH POSITIVE BREAKING PRESSURE OF 2500 TO 2700 POUNDS.
STEM SPRING & STEM TANG OF TOOLSTEEL HARDENED & GALVANIZED
OXYGEN–HYDROGEN–NITROGEN–AIR.
HIGH PRESSURE SERVICE
CONFORMING TO THE REQUIREMENTS
BUREAU SAFE TRANSPORTATION EXPLOSIVES
JANNEY STEINMETZ & Co. PHILADELPHIA NEW YORK
SCALE — DATE NOV. 10. 16
No 7

(*Continued from page* 386)

Before reaching the ground—at a height of 50 or 60 feet, say—turn sharply in the direction in which you intend to land, permitting the machine to skid, or slide out, on the turn. You will then be headed in the proper direction, but skidding badly against the drift. Hold the machine in the air until the side-wind neutralizes the skidding tendency, or *vice versa,* skimming along just above the ground as in a high speed landing. This system requires considerable practice to learn, but is very useful when the field is so arranged as to make descents at right angles to the course necessary.

When landing *with* the wind, the tail should be kept as low as possible. As the machine slows down on the ground, the pilot must be on the alert to check any "slewing" tendency, as the machine will try to swing around. Tail-wind landings usually require quick work with the rudder.

In this article, the writer has tried to meet most of the conditions likely to arise in small-field work. If pilots will look over the ground thoroughly, and figure out every possibility and condition in their own minds before they fly, all will be easy. For remember—the proof of the aviator is in his head-work!

CURTISS MODEL R-4 TRACTOR

WITH the exception of a central 12-foot wing section, the Model R-4 is similar to the machine used by Victor Carlstrom in his flight from Chicago to New York. In Carlstrom's "New York Times" machine, the central 2′ 6″ wing panel over the fuselage was removed, and in its place a panel 12 feet long was added, the extra surface being necessary to carry the great weight of fuel sufficient for this flight.

General Dimensions

Span, upper plane	48′ 6″
Span, lower plane	38′ 2″
Chord	6′ 3″
Gap	6′ 8″
Length overall	28′ 9″
Height overall	13′ 0″
Motor, Curtiss	200 h.p.
Speed range	90-50 m.p.h.
Net weight	1,800 lbs.

Planes

Planes are formed to the R. A. F. 6 curve. At forward struts the wings are 5¼″ thick. Planes set at an angle of incidence of 2½ degrees. Dihedral angle, 3 degrees. There is a stagger of 12⅝″. Chord, 6′ 3″; gap between planes, 6′ 8″.

Panel over fuselage, 2′ 6″ wide. A space of 1⅜″ is left between this panel and upper wing extension, and between the fuselage and lower wing. From the central panel upper planes extend 23′ 0″, bringing the overall span to 48′ 6″. From the fuselage, lower planes extend 17′ 10″, bringing the overall span to 38′ 2″.

Forward main wing spars, 10″ from leading edge; spars 4′ 0″ apart. Wing curve, between leading edge and forward main wing spar, is formed of veneer. Top of lower planes, between the two ribs next to fuselage, covered with veneer and rubber matting, so the passenger can walk upon the planes in getting to the forward cockpit.

Interplane struts centered 6′ 6″ from fuselage struts. They are of streamline section, 4½″ deep at center, 1⅝″ thick; tapering to 2″ deep at the ends, and 1″ thick. Outer struts 13′ 10″ from fuselage. These are 3½″ deep at center, 1⅜″ thick; tapering to 1⅞″ deep at the ends, and ⅞″ thick. Overhang bracing carried on 16″ struts on top of upper plane. Below the outer struts, 1″ bowed rattan buffers are provided to keep the wing tips from touching the ground in starting and alighting.

Wiring between forward and rear struts, No. 8 stranded cable. Flying wires of inner panel, No. 6 gauge; landing wires, No. 8. Outer panel wired with No. 8 cable. Landing wires single; flying wires doubled. Planes braced to radiator by No. 6 gauge cables.

Two ailerons on upper plane 12′ 8″ long, 16″ wide. Two ailerons on lower plane, 7′ 8″ long, 16″ wide. One streamline steel tube connects upper with lower aileron.

Side view of the Curtiss Model R.

Fuselage

Fuselage is 24′ 6″ long. Longitudinals at the radiator, 1⅝″ by 1¼″ ash, tapering to 1¼″ square at the pilot's seat, and continuing in taper to the tail. Uprights in forward part of fuselage, straight, channeled spruce, braced with stranded cable. Rear uprights and spacers in rear section of fuselage, tapered and beveled spruce, braced with solid wires.

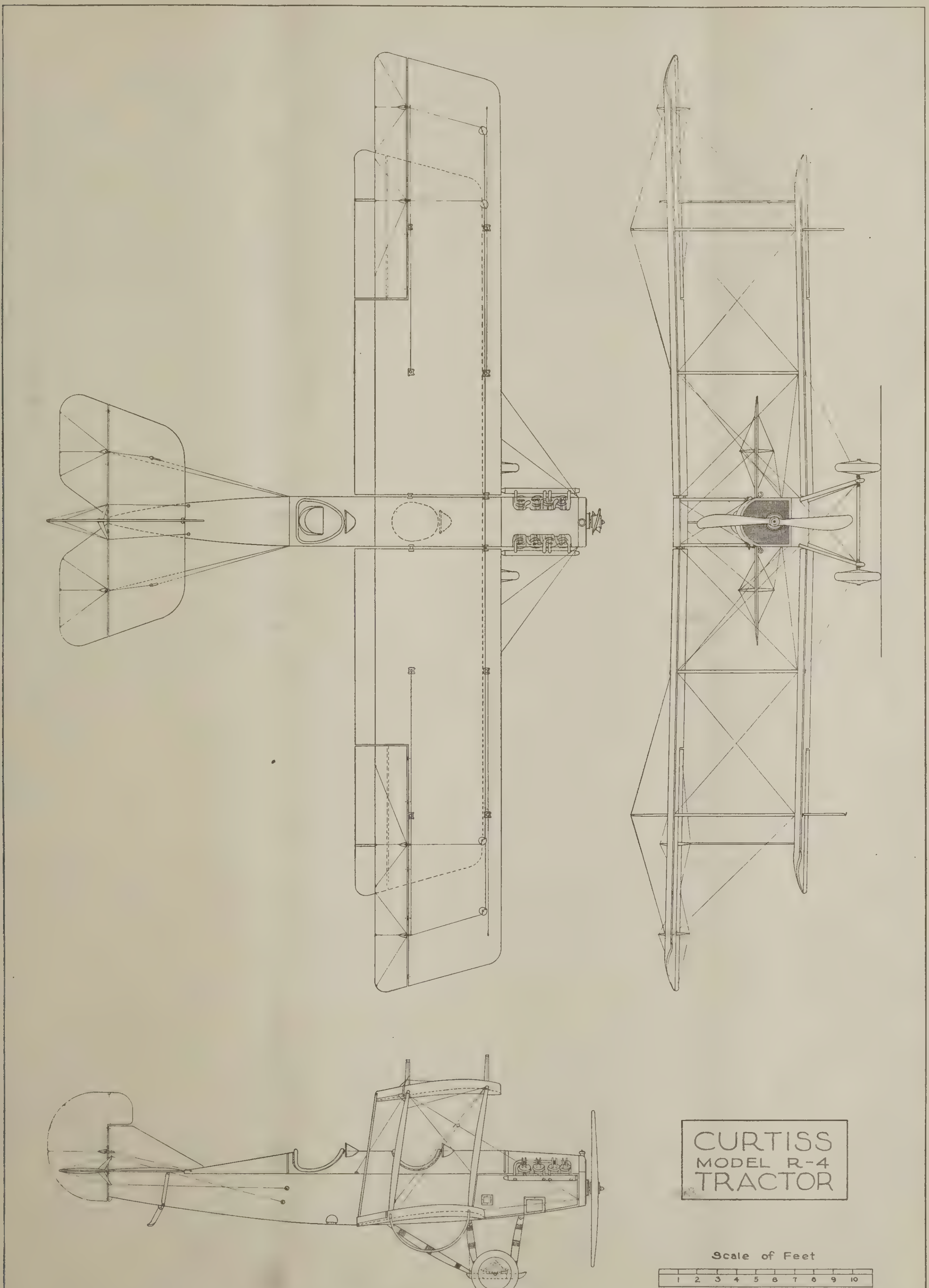
Forward of front struts the fuselage is covered with sheet steel. Fuselage top, as far back as the pilot's seat, is formed of sheet steel. Elsewhere covering is linen. From rear seat to leading edge of stabilizing plane, the curved fuselage top is removable for inspection and adjustment of wiring, being held to the upper longerons by a strip of sheet steel with provisions for attachment by cotter pins.

Dep control. Rudder wires doubled No. 8 cable to rudder levers; from the levers two solid No. 12 wires run to rear edge. A slotted disc of leather is provided where rudder controls pass through fuselage top. Tail flap control wires, No. 6 cable to the levers. From each lever, three solid No. 12 wires run to the trailing edge of flaps. Where cables pass through sides of fuselage, slotted discs of heavy pigskin are stitched to fuselage covering.

The dashboard equipment consists of: Ogilvie Air Speed Indicator; Taylor Altimeter reading to 10,000 feet; Warner Electric Clock; Stewart-Warner Revolution Indicator; U. S. Oil Gauge; Manhattan Magneto Switch; Taylor or Jesnig Fore and Aft Level and Inclinometer. A Sperry Compass is held in brackets extending down from the dashboard. Electric lights are disposed about the cockpit and dashboard so as to render all instruments readable. Suitable controls are located at side of cockpit for the adjustment of magneto and carburetor. Lunkenheim pump on outside of fuselage within easy reach of the pilot.

(*Continued on page* 394)

Model R-4 Curtiss military tractor.



CURTISS
MODEL R-4
TRACTOR

FOREIGN NEWS

FRANCE

It is reported that Captain Beauchamp, the hero of the recent raid on Munich, reached Paris recently from Rome. He was very warmly congratulated on the success of his flight. He would, he explained to those who met him, rather have returned by way of the air, but unfortunately his machine was slightly damaged upon landing. He erfused to be interviewed, but certain further details of his flight have become known through one of his friends. At the outset of his flight, mist made it difficult for him to verify his position. At Friedrichshaven he was furiously bombarded, but continued flying at a low altitude until he reached Munich. He then rose and dropped seven bombs on the Station, all of which reached their objective and exploded. He rose to a height of 1,200 feet, and turning southward made a good passage across the Alps. At last he recognized Venice and the Adriatic, and landed. He was enthusiastically received at Venice by Admiral Derevel. Gabriel D' Annunzio offered him a gold medal, and at the Italian headquarters he was received by Generals Cadorna and Porro. The King of Italy personally decorated him with The Order for Valor, and at Rome he was feted. He intends to carry out fresh raids at the earliest possible moment.

GERMANY

The official report for Germany on December 11th stated that on the Verdun front seven hostile aeroplanes were shot down by German anti-aircraft guns and in aerial engagements.

The following letter is reproduced from "The Aeroplane," which paper carries it as a letter from a German officer of the 170th Regiment.

"You in Champagne are no longer in the witches' caudron on the brim of which we are sitting—always waiting the moment to fall in from one side to the other. It is turmoil here again. The air has been alive with aviators the last few days, and still more so with the heavy shells that have been flying over us and onto our poor comrades on our flank and onto our batteries.

"The number of guns—and of the heaviest calibre—which England now possesses is uncanny, and the amount of ammunition they fire off is fabulous. In addition—what makes it so bad—the aviators are constantly over our lines. They point out our batteries so that they may be peppered, and are always attacking our captive balloons, which is the same as putting our eyes out. Meanwhile the air is black with air-craft, whereas our aviators—but of that why speak. It would be merely pouring water into the Rhine. We could save many thousands of lives if we had the English aviators and gunners. It makes me dispair when I think of it at all."

GREAT BRITAIN

Vernon Castle has opened a private American bar, with the latest New York cocktails and appetizers, at the British front, and he says he is going to teach a monkey he has just bought as a mascot, to do his bit as a bartender.

Castle, once dancer, now is a Lieutenant in the Royal British Flying Corps, and is in Paris to obtain a fast French flying machine. He has just been promoted to operating a single-seated aeroplane on defensive patrol work, after destroying a German machine last week.

"This is my first vacation since last May," said Castle. "I have been piloting machines for all departments, with photographers, bombers, artillery fire regulators and everything. Brussels is the longest flight I've made."

The first clear day Castle says he is going to drive his new machine back to the front with the monkey as a passenger. He wanted to have a lion cub, like most of the other American aviators, as his mascot, but lion cubs are hard to find in Paris.

"But the monkey will help in my bar," he said. "I get the wet goods sent from home, and ice from Saint Omer. Now, don't write any hero stuff about me."

Colonel Wilfrid Ashley, M. P., president of the Parliamentary Air Committee delivered an interesting address on "The Command of the Air" to a meeting of the members of the 1900 Club recently. Viscount Preel presided and several distinguished visitors from the Overseas Dominions were present. Col. Ashley reviewed the development of British aviation during the past years from the point of view of National Defence, and paid a warm tribute to the splendid achievements of the officers and men of the R. N. A. S., and the R. F. C.

He explained in convincing terms the absolute need of the moment for closer co-ordination between the Naval and Military branches of the Air Service, and showed how intensely important it was in the vigorous prosecution of the war to secure unified control in all matters relating to the design of the machines, contracts, stores, and the supply of material. He appealed for the full and unqualified support of the country for the Air Board under the presidency of Lord Curzon, and said that until large executive powers were conferred upon the Air Board by the Government air-craft as an essential part of our organization could not achieve its highest point of efficiency.

He expressed his deep regret that difficulties had been placed in the way of a great unified Air Service by the Board of Admiralty, and he sincerely hoped that the Prime Minister and first Lord of the Admiralty would realize the importance of a full recognition of the functions of the Air Board by the Admiralty at the earliest moment.

He was satisfied that the Air Board should include a representative of the Board of Munitions, and he was confident that a board thus composed of officers from the Navy, Army and Munitions Departments under a powerful and capable minister like Lord Curzon would ultimately achieve the command of the Air.

How the American scientists were indirectly aided by the war is told in a recent news item from Great Britain. The Crocker Cancer Research Fund of Columbia University has been, for a long time, testing the effect of radium as a cure for cancer, and as is the general practice had made the experiment on rats.

London's fear of Zeppelins has given to the Crocker Fund a duplicate of the most extensive and valuable collection of tumors and cancers in the world. For years cancer laboratories in London have been transplanting into small rodents every known variety of tumor.

When the war came and it was realized that the bombs of a Zeppelin might completely wipe out the laboratories of the Imperial Cancer Research Fund scientists of England and America, realizing the value of the British tumor collection, began to make a duplicate of it, which was to be brought to America, where there was no danger of high explosives destroying years of painstaking work.

Accordingly rats, mice and guinea pigs were sent to London, and there the malignant growths which had been nurtured in their fellows were transferred to them. These animals were than brought across the sea, and the Crocker Fund has now a complete duplicate of the London collection. Since their arrival they have been treated with radium and other "cures."

JAPAN

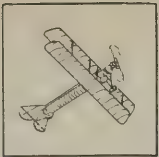
Japan's share in the development of aeronautics has been slight, but there are indications that those interested in the art will in future encourage private enterprise in emulation of official activities. An immense stimulus in this direction has been the visit to Japan of two young American airmen, the late Cahrles Niles, whose death took place in America, and the still younger Art Smith.

For some time America and Europe, after the initial achievements of the Wright brothers, were divided in opinion on the question of the relative value of airships and aeroplanes. Japan's first aeronaut favored the lighter-than-air machine, and Yamada's balloon played a part both in the Chino-Japanese and Russo-Japanese wars. Yamada, who died only a year or two ago, had given the subject great study, and at the time of his death was experimenting with different qualities of silk and other materials of which the gasbags are usually constructed. He remained to the end a firm believer in the dirigible. The world, however, has decided in favor of the heavier-than-air machine and Japan has wisely followed in its footsteps.

Japan has much to hope for from the National Aviation Society, which was formed in 1914, and has been very active. Unlike most other accociations that are formed for the encouragement of particular activities, this society has grown in usefulness, and today has many thousands of members, all of whom realize that aviation is bound to develop and that Japan must do its share in the development.

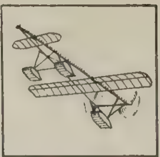
This society some time ago offered three prizes ranging from 20 to 5 thousand yen for the best homemade motors, the effect of which was to greatly encourage Japanese engineers. The final result of this competition was never made public, but a number of designs were sent in. It is probable that none of these came up to standard, and that the prizes still remain to be won, but undoubtedly the Japanese are devoting greater attention to aircraft motors as a result of the action of the society and, also, in consequence of the deepening conviction that Japan must not sit idly by, content to copy merely while active brains in the western world are solving great problems of the air.

R. E. P., French parasol monoplane.



MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

An Interesting Motor and Model from the West

The Motor

The six-cylinder carbonic gas motor described herewith is the product of Mr. Henry Rompel, Kansas City, Missouri, through whose courtesy we were enabled to reproduce a photograph of his model designed after the Deperdussin Monocque winner of the Gordon Bennett speed trophy at Chicago, 1912. This motor is perhaps one of the most interesting of its kind to have been developed during 1916, and its appearance in the model aeroplane field adds weight to the claim that mechanical motors will soon replace the rubber strand as motive power for model aeroplanes.

Mr. Rompel's motor is of rotary, carbonic gas type, having six cylinders, a bore of ⅝ of an inch and a stroke of ¾ of an inch.

The intake is derived through a rotary valve which also acts as a crank shaft bearing, thereby saving weight.

The exhaust is accomplished by mechanically operated valves situated in the heads of the cylinders being opened by the aid of rocker arms and push rods which gain their timing from a cam placed on the crankshaft.

To save weight in construction the crankshaft, connecting rods, pistons and cylinders were made of telescopic tubing with a side wall of one thirty-second of an inch or less in thickness.

The motor has a swing of 5½ inches over all, weighs a little less than 8 ounces complete.

This motor is operated on 1,500 pounds pressure (carbonic gas) and at a speed of 3,500 to 3,700 r.p.m. will develop about 1 horse power. While spinning a 17-inch propeller with a pitch of 20 inches it will deliver a thrust of 21 ounces, and has a duration of 40 seconds. Two hundred and fifty-six pieces were embodied in its construction.

The Model

In our issue of December 11th, we printed a photograph of the model of the Gordon Bennett Deperdussin Monocoque, which was constructed by Mr. Henry Rompel and Mr Spencer T. King, both of Kansas City, Missouri, the description of which we print herewith.

The dimensions of the plane are in direct proportion to the original machine which won the Gordon-Bennett speed trophy at Chicago in 1912.

The span of wings is 54 inches; length over all 34 inches; the body is slightly under 6 inches in diameter at the front end and tapers toward the back being made of 60 strips of wood glued together over a form and afterwards dressed down to 1/16 of an inch at the front end and tapering in thickness, the back being about the thickness of heavy wrapping paper.

The motor hood is made of aluminum, spun to 34 gauge, as is also the propeller boss.

The landing gear is equipped with strand rubber shock absorbers similar to the original machine. The wire spoked wheels are given the stream effect by being covered. The weight of the machine, less power plant, is 25 ounces; complete with power plant, ready to fly, 3 pounds 12 ounces.

William B. Stout Active in Detroit

Plans of William B. Stout, manager of the aircraft division of the Packard Motor Car Company, to organize in all of the high schools of Detroit model airplane clubs, are comprehensive. Mr. Stout organized a similar club in Chicago, known as the Model Aero Club of Illinois. This organiration developed from model airplanes actual aircraft in which the members are to-day flying professionally. The various Detroit organizations will be brought together in annual competition, according to the plans.

Wind Pressure on Aerocurve Surfaces

By V. E. Johnson

Desiring to obtain some information with respect to the wind pressure on the windward and lee side of an aerocurve, and being unable to obtain any published information either in English or French text books save the well-known classical experiments on plane surfaces at impossible angles of flight, the writer had recourse some time ago to the one and only method left, viz., that of personal experiment.

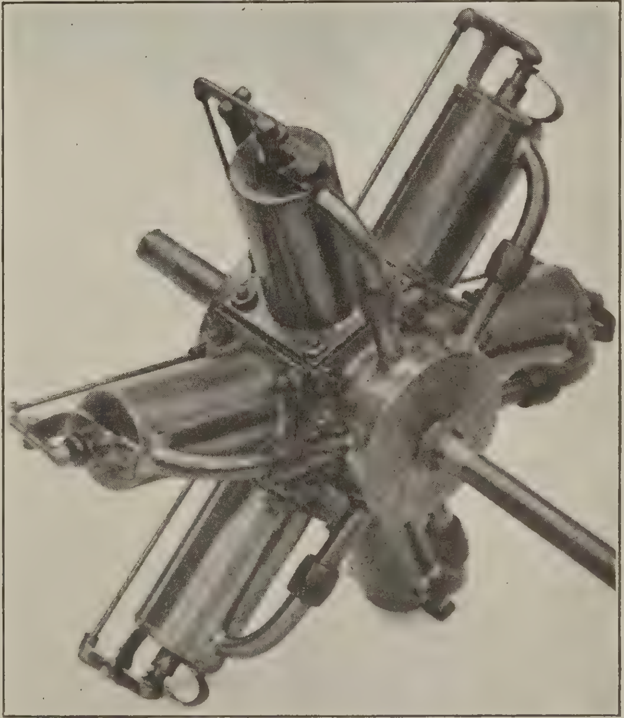
The results obtained are shown graphically in Fig. 1—A, B and C.

The curves do not show the pressures in any especial unit, but regarding a vertical section at any point as representing some particular unit, the rest of the curve gives a correct proportionate representation in that same unit.

The experiments were made with great care—three different kinds of manometers were used—an open tube connected by flexible tubing with a thread of colored alcohol in a U-shaped tube; in another case, a modified form of Pitot tube in conjunction with a more sensitive gauge, and in the third case a tube similar but somewhat larger than the first, over which a very thin membrane was stretched, connected with a drop of alcohol in a fine horizontal tube, the movements in the latter case being very small.

(To be continued)

Editor's Note: Chart containing dimensions of aerocurve will appear in our issue of January 1st.



The Rompel six-cylinder carbonic gas engine.

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Our Own Little Dictionary

(Second Spasm.)

(1) **Air Flow**—Findings of a committee.

(2) **Bending Moment**—Discovery of a quarter on the sidewalk.

(3) **Dipping Front Edge**—Either end of a piece of toast.

(4) **Inclination of an Aeroplane**—Sometimes it will go, more often not.

(5) **Interference of Aerofoils**—Crowd swarming on aviation field.

(6) **Leading Edge**—See Dipping Front Edge.

(7) **Master Diameter**—The waist measure of the factory foreman.

(8) **Moment of Inertia**—Just before the alarm clock rings.

(9) **Overhang**—(Nothing to do with the morning after the night before.)

(10) **Resistance to Motion**—An Army Mule.

Some Excuse!

Ernest C. Bass, of 42 Thirty-eighth street, New York City, when brought before a magistrate, interposed a novel defense for speeding his automobile.

"I have been riding in aeroplanes frequently of late," said Mr. Bass, "and going at the rate of 90 and 100 miles an hour through the air has made me lose realization of speed when riding in an automobile."

Wonder if the Wing Dope Was Poisonous?

Chicago, Dec. 2.—Eugene Heth, aviator, asked $35,000 damages from John S. Berger. Heth was compelled to leave his machine in Berger's cornfield overnight. The cows ate the wings. Berger had Heth arrested as a trespasser. Heth charges false arrest.

Not Up on Golf

President Alan R. Hawley, of the Aero Club of America, was defending at a dinner in New York an American aeroplane that had been attacked.

"The men who attacked this aeroplane," he said, "are as ignorant of flying as the farmer was ignorant of golf.

"A farmer, crossing a golf field, got hit by a ball in the eye. He ran back and roared at the golfer.

"'This'll cost ye jest $5 cash in the hand down!'

"'But I yelled "Fore!" at the top of my lungs,' said the golfer.

"'Oh, did ye?' said the farmer, in a mollified tone. 'Well, I didn't hear ye. I'll take four.'"

Second Entry for Aeroplane Race

The following letter was received from Mr. Abel Iffimaliff of Milwaukee, announcing his entry in the greatest aeroplane race ever held, or dropped.

Aerial Age Weakly,
Der Editor,
Dear Mr. Gentlemen:

Blease except der entry into your greadt race from me, Abel Iffimaliff, foreman from one off der bests beer breweries in United States. Ich habe read mit interests der letter from Herr I. M. Likely, und while in mosts cases he iss right, he iss all wrong. Aber, as they say in Berlin, Das machts nichts aus.

I am sure when I tell you of the vonderful new principle from the vorkings of the engines Herr Likely vill resign mit embarrassment from the race. Der whole maschinery depends from the strong action off limburger cheese, vich is imported from Deutschland on der submarines. Der cheese is placed into a can, made from tin, und bolted very strong to resist der action from the cheese. From the top of der can extends a pipe leading to a steam turbine, only it has no steam in it. The cheese iss very carefully chained to brevent it escaping avay from the can. Der aeroplane stays on der ground vhile the cheese makes up its mind vhether to go or not. Ven the cheese decides to begin to start der aeroplane driver makes open der pipe into the turbine, und the air in the can tries to escape from der terrible punishments from remaining in the can mit der cheese. Der air descends in the direction of upwards und turns der turbine mit speed. Attached to the turbine iss a chain leading to a propeller. Der air turns der turbine, der turbine turns der chain, und darfur der propeller revolves mit speed of lightening, under der aeroplane travels very fastlich.

Der only trouble mit der invention iss that I have not yet figured out how to stop der machine once it goes.

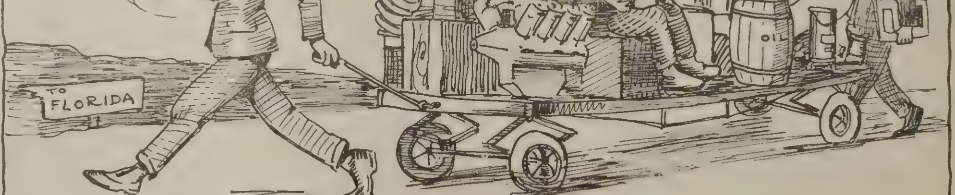
At der present writing I am trying to figure der whole bossibility und ven I arrive at a delusion I vill tell you der idea, and send in a complete discription of the engine.

I also am making experiments founded on the action of alcohol on the throat mussels, und will apply the results to aviation engines.

Very respectively yours,

Abel Iffimaliff.

Ohhhhhhh!!!!—(*Sigh of relief at finishing another page.*)



Southward Bound. The Curtiss Aviation School Removes from Buffalo to Miami, Fla.

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Against Any Possible Forced Landing Is Gained by This Machine in Its Ability to Climb on One Motor

Recently piloted by Victor Carlstrom 661 miles, when equipped with pontoons, in 8½ hours in flights for the Curtiss Marine Trophy, making greatest mileage for this contest so far recorded.

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It indicates the North accurately.

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Its accuracy is always maintained.

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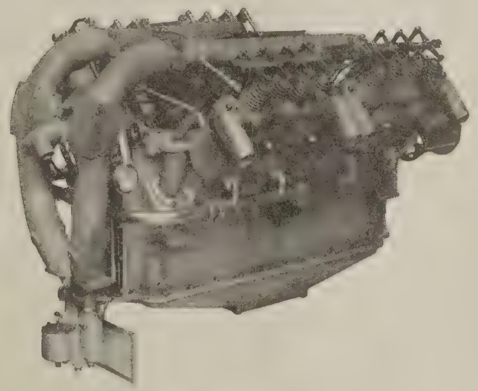

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THE INIMITABLE BEARING

(*Continued from page* 383)

described by the prophet Ezekiel, and, as compared with the successful types of aircraft of the present day, it would appear that our modern aeronautical engineers are working along lines that correspond slightly, but very slightly, with those of the prophet of old.

A programme of special events for each day of the show as well as of scientific papers to be read by various authorities is being prepared, and it is expected that a great majority of the American engineers who are responsible for the development of aeronautics will be present.

Aeroplanes and devices intended to make aircraft safe and simple in operation are expected to be so convincing at the exposition that those who see them will be satisfied that the element of danger has been very largely eliminated, to say nothing of the simplicity of control.

Among the factors that contribute toward this end are the electric starters, similar in a way to those used in automobiles by means of which the motor is started and the propeller sent spinning by the mere pressing of a button, which does away with the customary propeller cranking and enables an aviator to land and get away without the assistance of others, as well as numerous gyroscopic and other stabilizing devices calculated to keep the aeroplane in an even plane.

It is expected that the Pan-American Aeronautic Exposition will serve to arouse interest in thousands who are but superficially aware of the great development that has taken place in this branch of scientific activity during the last two or three years, and it is expected that this aroused interest will result in a stronger public interest in this arm of the general campaign of preparedness.

(*Continued from page* 388)

Landing Chassis

Two wheels with 26" by 5" Goodrich tires, sprung on a steel tube axle, 1¾" in diameter. Axle runs in a guide attached to a short skid.

The six stout streamlined chassis members are bound with cord to prevent splitting.

Short skids are spaced by two spruce struts, one forward of the axle and one behind the axle, cross wired and braced to lower plane by cables running from beneath forward inner plane struts.

Tail Group

Stabilizing plane, non-lifting; area, 40 sq. ft. Plane braced from beneath by a ¾" streamlined steel tube running up from lower fuselage longerons at either side of plane.

Tail flaps each have an area of 13 sq. ft.

Tail flaps attached to stabilizing plane by six hinges. Each flap has an area of 13 sq. ft. Control cables to upper control arms of tail flaps are led through a duct running through the stabilizing plane.

Rudder hinged to fin and braced to tail plane above its pivot by a solid wire.

Tail skid, ash, sprung on rubber cord enclosed in fuselage, and pivoted on a universal joint.

Motor

The motor is a Curtiss "V 2, Type 3," rated at 200 h.p. at its normal speed of 1,400 r.p.m. Maximum speed, 1,500 r.p.m.; minimum, 200 r.p.m. It is of the V type, with eight cylinders arranged at 90 degrees. Bore, 5"; stroke, 7".

Two high tension 8-cylinder Berling magnetos located on front of crankcase cover. Two Zenith carburetors located between cylinders, inside the V.

Net weight of motor, 667 lbs. Provision is made for the installation of a "Perfect" self-starter. The starter itself weighs 30 pounds; complete with all fittings, compressed air tank, control valve, gauge, tubing, etc., the weight is 65 lbs.

A Pilot's Necessity

THE accompanying illustration shows the compactness and completeness of the Cooper Aeronautical Tool Box. With the assortment of tools shown the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

After five years of flying experience these tools have been selected to meet every requirement for Aeroplane service. The size of the box is 28 x 9 x 10 inches.

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Living expenses low.

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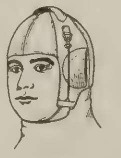

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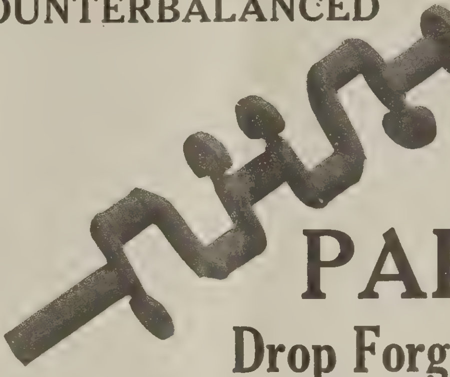

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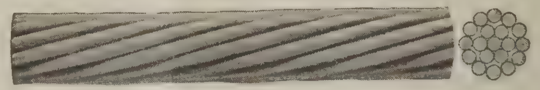

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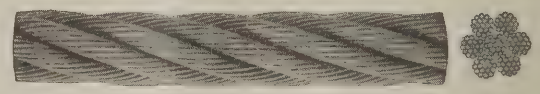

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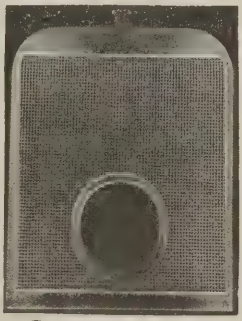

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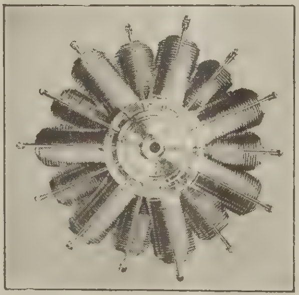

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LICENSED AVIATOR WHO FLYS TRACTOR or pusher machines using either one of three controls, wishes position doing exhibition work or carrying passengers. Best references. 127½ East Third Street, Los Angeles, Cal.

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FOR SALE—8-CYLINDER, 60-H.P. HALL-Scott, in fine condition, $550.00; also have 6-20 x 4 wheels with Goodyear tires; will sell cheap. Box 623, Dallas, Texas.

BOOKS FOR THE AERONAUTICAL STUDENT'S LIBRARY.

Principles of Aeroplane Construction by Rankin Kennedy	$1.50
Aerial Navigation by Dr. A. F. Zahm	3.00
Aero Engines by G. A. Burls	3.00

The Aeronautic Library, 280 Madison Ave., New York City.

TECHNICAL AND PRACTICAL EXPERIENCED airship builder on rigid dirigible types, with U. S. Patentlessee for hydro dirigible airship, interested by the Government, seeks connection with some reliable party to take up this matter. Box 108, Aerial Age, 280 Madison Avenue, New York City.

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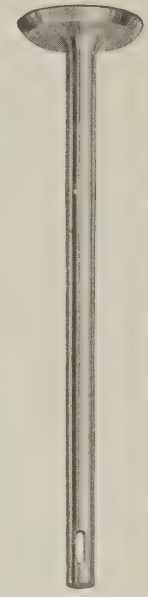

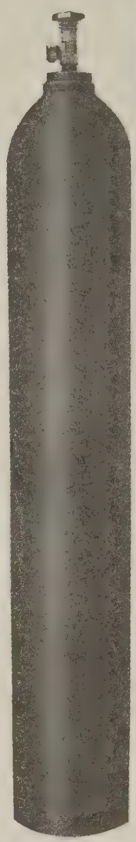

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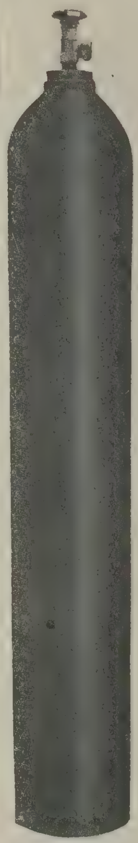

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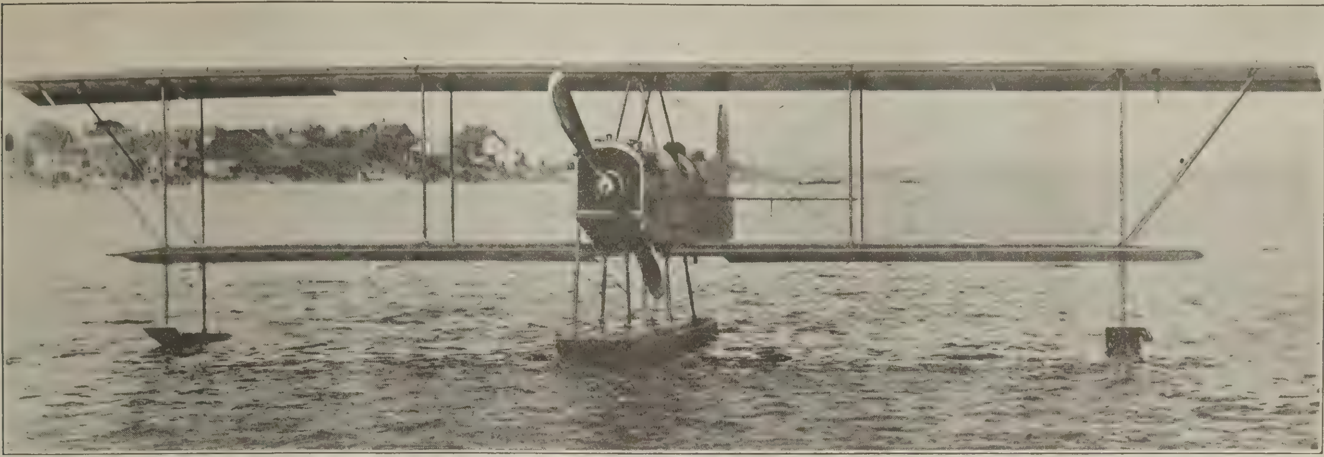

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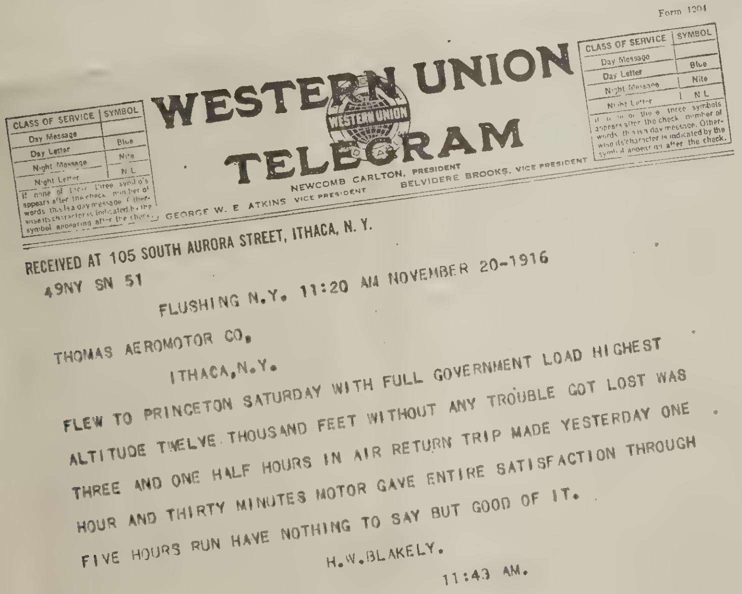
Hydroplanes and pontoons designed and manufactured for airplanes of every type, including Curtiss, Sturtevant and other makers.

Designers and constructors for the U. S. Army and Navy and British Admiralty.

THE BURGESS COMPANY : : : MARBLEHEAD, MASS.



Form 1204

CLASS OF SERVICE	SYMBOL
Day Message	
Day Letter	Blue
Night Message	Nite
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a day message. Otherwise its character is indicated by the symbol appearing after the check.

WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT
GEORGE W. E. ATKINS, VICE PRESIDENT
BELVIDERE BROOKS, VICE PRESIDENT

CLASS OF SERVICE	SYMBOL
Day Message	
Day Letter	Blue
Night Message	Nite
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a day message. Otherwise its character is indicated by the symbol appearing after the check.

RECEIVED AT 105 SOUTH AURORA STREET, ITHACA, N. Y.

49NY SN 51

FLUSHING N.Y. 11:20 AM NOVEMBER 20-1916

THOMAS AEROMOTOR CO.
ITHACA,N.Y.

FLEW TO PRINCETON SATURDAY WITH FULL GOVERNMENT LOAD HIGHEST ALTITUDE TWELVE THOUSAND FEET WITHOUT ANY TROUBLE GOT LOST WAS THREE AND ONE HALF HOURS IN AIR RETURN TRIP MADE YESTERDAY ONE HOUR AND THIRTY MINUTES MOTOR GAVE ENTIRE SATISFACTION THROUGH FIVE HOURS RUN HAVE NOTHING TO SAY BUT GOOD OF IT.

H.W.BLAKELY.

11:43 AM.

Just a Line of Appreciation From One Who Knows

THOMAS AEROMOTORS

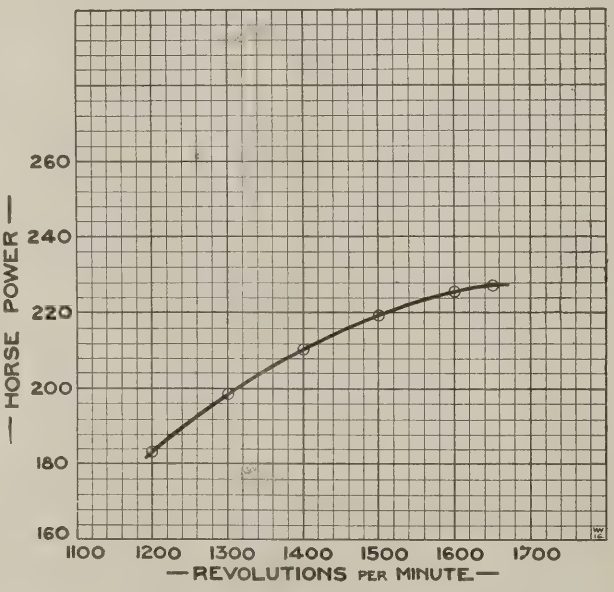
Mr. Blakely of the L-W-F Engineering Company of College Point, N. Y., has now been flying their machines equipped with *Thomas Aeromotors* for approximately six months. The above telegram speaks for itself.

THOMAS AEROMOTOR CO., Inc. - Ithaca, N.Y.

Curtiss

MODEL VX-3 motor was used by Victor Carlstrom on November 2nd in flying from Chicago to Erie, Penna., a distance of 452 miles, in 3 hours 57 minutes.

Owing to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

CURTISS AEROPLANE & MOTOR CORPORATION

BUFFALO, N. Y.

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1917

AERIAL AGE

WEEKLY

Vol. 4, No. 16 JANUARY 1, 1917 10 CENTS A COPY

Sperry Takes Steps to Supply Much Needed Aeronautic Maps

Military Aviation
By Brigadier-General Scriven

Construction and Operation of Kite Balloons—By Ralph H. Upson

Automatic Pilot Installation in Twin Motored Hydro-Aeroplanes Described

Aeronautical Rubber Goods

We Specialize in the Manufacture of

BALLOON FABRICS

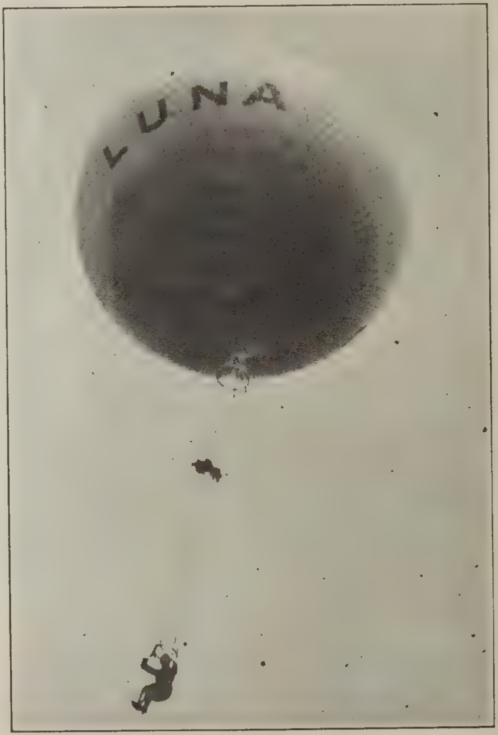
and are also in position to furnish the following:

Clothing for Aviators

Warm
Waterproof
Windproof

Shoes for Aviators—

Light
Flexible
Non-Slipping
Waterproof



NO SIGNS OF WEAR AFTER A SUMMER'S USE
Being constructed of our fabric, the elements to which it was exposed all summer had no deteriorating effect.

Mechanical Sundries

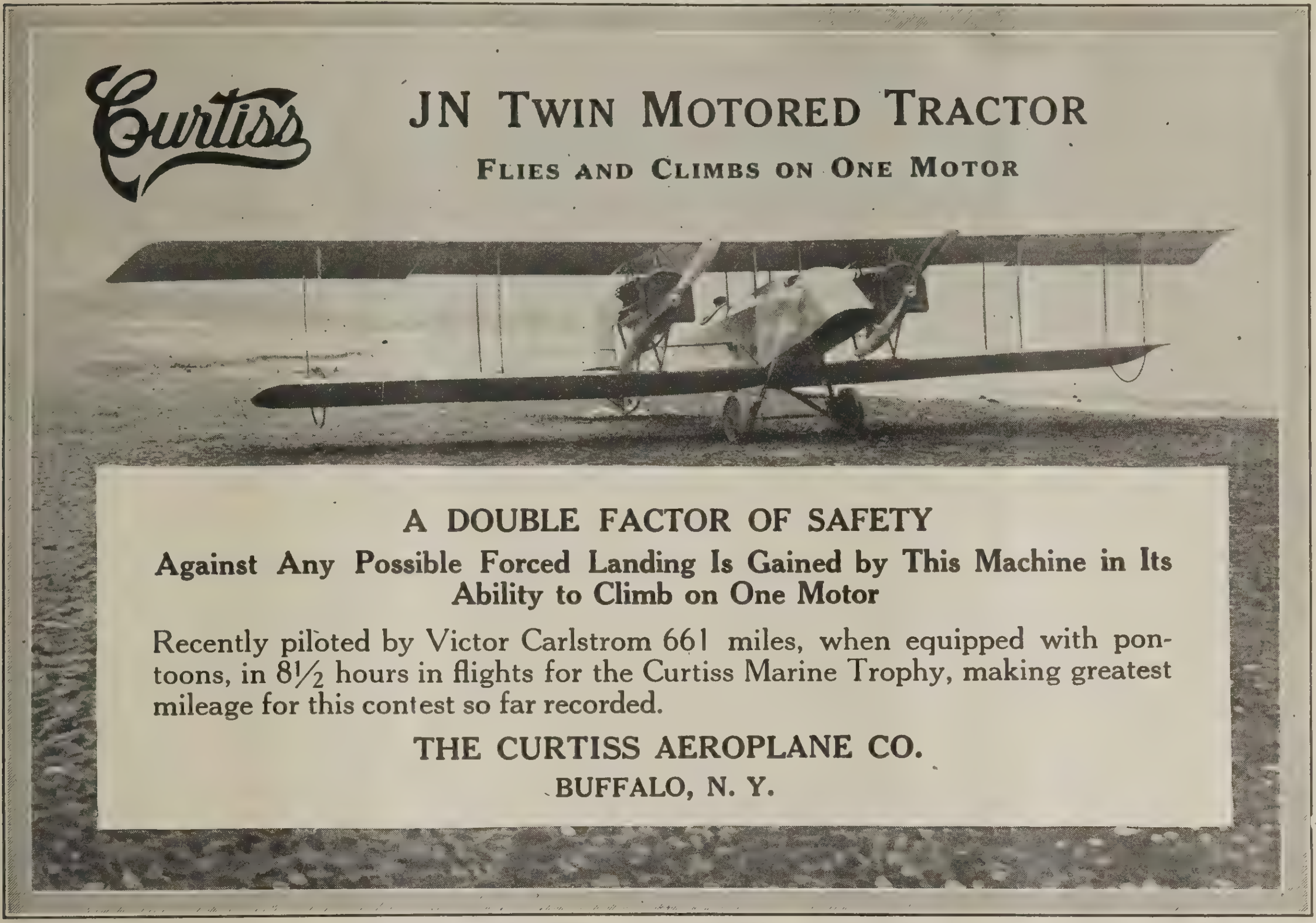
for
Aeroplanes,
Flying Boats
Etc., Etc.

Shock Absorbers

Gasoline Hose,
Rubber
Matting

United States Rubber Company

1790 Broadway
New York



Curtiss

JN TWIN MOTORED TRACTOR

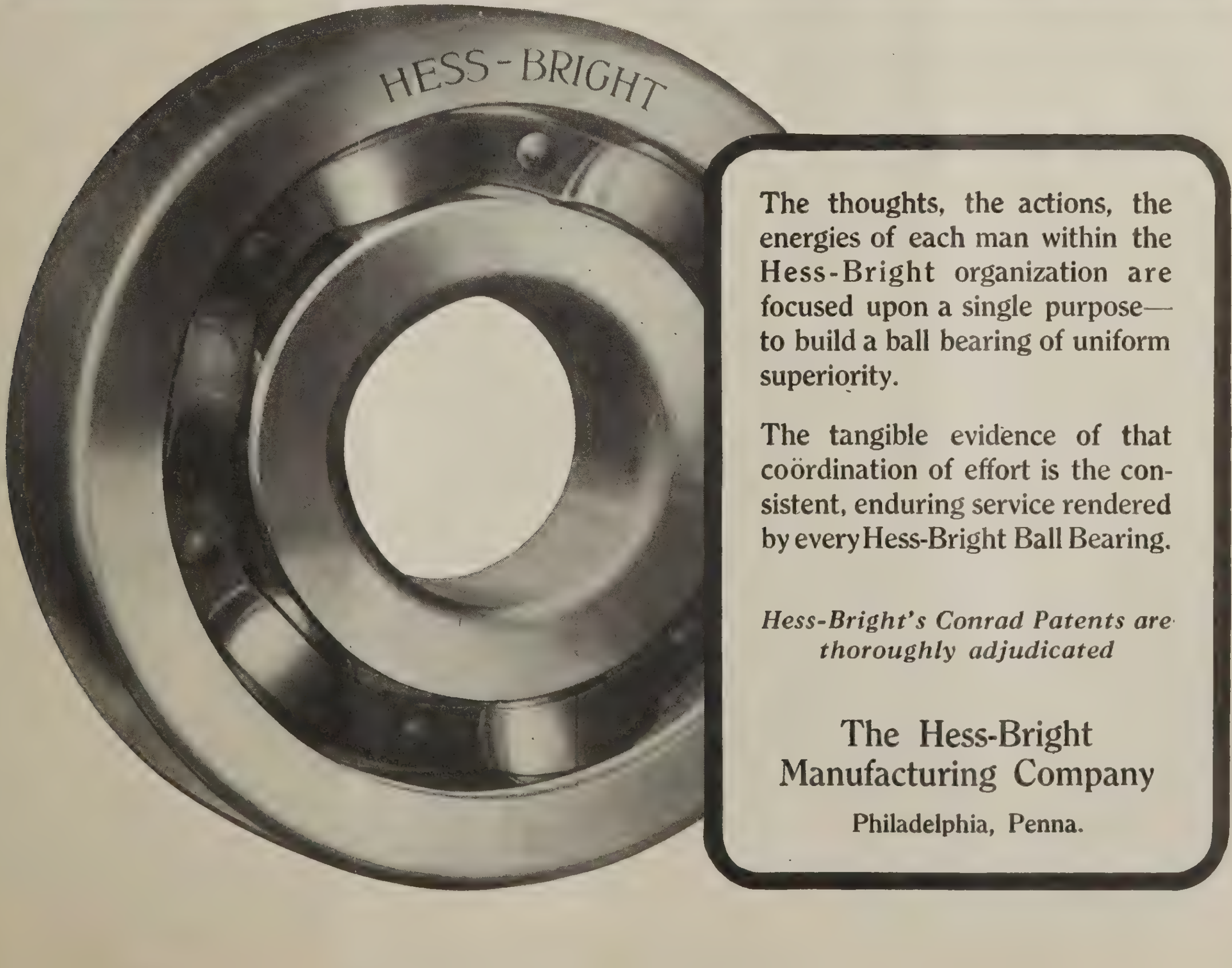
FLIES AND CLIMBS ON ONE MOTOR

A DOUBLE FACTOR OF SAFETY

Against Any Possible Forced Landing Is Gained by This Machine in Its Ability to Climb on One Motor

Recently piloted by Victor Carlstrom 661 miles, when equipped with pontoons, in 8½ hours in flights for the Curtiss Marine Trophy, making greatest mileage for this contest so far recorded.

THE CURTISS AEROPLANE CO.
BUFFALO, N. Y.



The thoughts, the actions, the energies of each man within the Hess-Bright organization are focused upon a single purpose—to build a ball bearing of uniform superiority.

The tangible evidence of that coördination of effort is the consistent, enduring service rendered by every Hess-Bright Ball Bearing.

Hess-Bright's Conrad Patents are thoroughly adjudicated

The Hess-Bright
Manufacturing Company
Philadelphia, Penna.

THE FIRST

PAN-AMERICAN AERONAUTIC EXPOSITION

Grand Central Palace, New York,
February 8th to 15th, 1917
TO FOLLOW THE AUTOMOBILE AND MOTOR BOAT SHOWS

Held Under the Auspices of

The Aero Club of America
The Pan-American Aeronautic Federation
The American Society of Aeronautic Engineers

THE preliminary announcement of the plans of the First Pan-American Aeronautic Exposition has created such tremendous interest, and so many requests for space have been received, that the original plans are being extended and the show space is being doubled.

The Exposition will afford the opportunity to show the tremendous progress that has been made in American Aeronautics in the past two years.

The people of two continents will come to the Exposition to see what the American Aeronautic Industry has produced for National Defense, utilitarian purposes and sport.

The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos - Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

APPLICATIONS FOR SPACE SHOULD BE ADDRESSED TO

HOWARD E. COFFIN
CHAIRMAN, ORGANIZING COMMITTEE
Pan-American Aeronautic Exposition
297 Madison Avenue, New York

G. DOUGLAS WARDROP
Managing Editor
RALPH E. deCASTRO
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HARRY SCHULTZ
Model Editors

AERIAL AGE
WEEKLY

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WALTER H. PHIPPS
FELIX PAWLOWSKI (Instructor in Aeronautics University of Michigan)
Contributing Technical Editors

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VOL. IV NEW YORK, JANUARY 1, 1917 No. 16

NATIONAL SITUATION CRITICAL

We Are Unprepared to Defend Ourselves and Powerless as Agents to Enforce Peace

PRESIDENT WILSON and Secretary of State Lansing were forced during the past week to let the American public see the handwriting on the wall, to make the nation realize the seriousness of the international situation, the fact that there is a growing possibility that we, too, may be drawn into the war. Secretary of State Lansing said:

"We are drawing nearer the verge of war ourselves. . . . The sending of this note will indicate the possibility of our being forced into the war. That possibility ought to serve as a restraining and sobering force, safeguarding American rights. It may also serve to force an earlier conclusion of the war."

Serious indeed must be the situation to make the New York *World*, which opposed increase armament for so long, state editorially that:

> **"In the more immediate aspects of the conflict the danger steadily increases that we, too, will be drawn into the war despite all our efforts to maintain neutrality. . . . We are obliged, as well, to consider a complete abandonment of our century-old policy against entangling alliances and for the sheer protection of civilization make ready to throw all our resources into a world-wide coalition to maintain peace by the brute power of overwhelming force. What is to become of the Monroe Doctrine we can only surmise."**

And we are unprepared to defend ourselves and could only be weak partners in a coalition of nations to maintain peace by force.

With this emergency our needs have become imminent and prompt steps must be taken to secure aviators, not by the hundreds, but by the thousands. We must now take steps to establish aviation school facilities to train five thousand aviators, giving the candidates every inducement.

The only legal way to get them into service are to get them into the Aerial Reserve Corps or from the Militia. We must get them and train them in the same business-like way in which the British Government went about getting the ten thousand men in the Royal Naval Flying Corps and Royal Flying Corps, taking all candidates that are available and physically fit.

Steps must also be taken to establish aviation and kite balloon training schools in number. England alone has one hundred and seven. We must establish many also, and as soon as possible..

We have training facilities for about two hundred aviators and all the training machines required. It is reported that the Aviation Section of the Signal Corps has received about 1,400 applications from candidates for the Aerial Reserve Corps.

The only mistake that can be committed is not to train enough men. That is a mistake which the country will not forgive.

LIVE INTEREST IN PAN-AMERICAN AERONAUTIC SHOW

Howard E. Coffin, of the Naval Consulting Board of the United States, who also is chairman of the Pan-American Aeronautic Exposition Show Committee, has been in Washington during the last week, where he has met and talked with numerous prominent Government officials on the prospects of the approaching Aeronautics Show and how it will act as a stimulus toward the establishment of adequate aerial defence in this country.

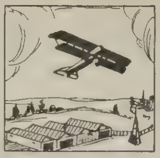
This first Pan-American Aeronautics Exposition will be held in Grand Central Palace, February 8 to 15, and is not to be a mere "show," but rather a comprehensive exhibition of what remarkable strides have been made in aircraft construction during the last few years, particularly since the war began, and is to become a permanent annual fixture, more in the nature of an institution than a show, for the influence of these expositions will be felt from one year to another throughout the aeronautic world. It will become the great clearing house for the industry and afford a convenient means of co-operation of the many interests connected with aviation and aerial military and naval defence, besides giving the general public an opportunity to keep pace with the development of this latest science.

"The exposition will afford a splendid object lesson in practical national preparedness," declared Mr. Coffin in Washington a few days ago. "Furthermore, it will be intensely interesting to all classes of people. When you stop to think for a moment do you realize that the great mass of Americans have never even seen a modern aeroplane or balloon? Aside from people who live in cities where these are made or tested the public only knows what they look like from war pictures in newspapers and magazines, and most of these pictures are so small that they do not convey any idea of the manner in which the craft operates.

"These exhibits of planes, kites, balloons, dirigibles and their many accessories will be interesting not merely to the technical student and military officer, but to the layman as well. Not only will adults be inspired by this exhibit, but schoolboys and schoolgirls as well will want to see it. It is perfectly astounding the amount of interest some school youngsters are taking in aviation and how much they have learned about the modern aeroplane and its workings. Many of these will be active in the aviation world a few years hence.

"The importance of this great exposition may be realized when the fact is revealed that the military authorities of practically every European and South American government will send representatives to the exposition to observe what America is producing. Then, too, the two appropriations of Congress, aggregating $45,000,000, for the building of aerial defences, will act as a great incentive to manufacturers of aerial craft and accessories who are anxious to bring the merits of their products to the attention of the Government and the general public. Many of these makers will exhibit at the show—some of them quite new to the aviation industry.

"The aeronautic industry at present is quite analogous to the automobile industry of some fifteen years ago. What was considered as impossible in those days is most commonplace to-day, and what we consider startling in the aeronautic field to-day will be an everyday sight a few years hence."



THE NEWS OF THE WEEK

Air Fleet Needed to Save Country

"The meaning of the great war abroad is very clear just now. The command of the sea, the command of the land are all worthless unless we have the command of the air," said Rear Admiral Robert E. Peary at the first seasonal dinner of the Hunters' Fraternity of America held in the studio of A. A. Anderson, artist and patron of art, at No. 80 West Fortieth street.

Admiral Peary sat at one corner of the table which was arranged in the shape of a cross. He was at the end directly under a grouping of electric lights so arranged as to represent the Great Bear, with the North Polar star above him. At the opposite arm of the cross sat Captain Roald Amundsen, navigator of the Northwest Passage and discoverer of the South Pole, with an electric grouping representing the Southern Cross of stars. At Admiral Peary's right was Captain Robert A. Bartlett, navigator of the Roosevelt, the only vessel ever to have been piloted through the dangerous American passage into the Polar sea.

Captain Amundsen and Captain Bartlett are both preparing for a drift across the North Polar Sea in 1918, and addressing these two younger men the veteran explorer said:

"For myself, I am through. I greatly envy Amundsen and Bartlett. Both are young men and they have a great future before them. Amundsen usually knows what he wants and what he is going to do and he has always met with success. I now look to these two adventurous youths to try to circumnavigate the two poles, by ship and by aeroplane.

"There are millions of dollars worth of property in New York, and for defence we must bring the airship. Billions of dollars worth of property may be ruined unless we have a great air fleet for its protection. Even Panama can be protected and must be protected with the air fleet. Our very national existence, shaped and developed, by our forefathers, may be lost to us, unless we have a great air fleet."

John W. Griggs, formerly Governor of New Jersey, was toastmaster, and speeches were made by him, Captain Amundsen, Patrick Francis Murphy and Dr. M. P. Rooseboom, assistant secretary of the Permanent Court of Arbitration of the Hague.

Some of those present were Mayor Mitchel, George McAnneny, Marston T. Bogart, James Barnes, Robert Boettger, Charles A. Bryan, Albert H. Marckwold, Hon. Seton H. Beresford, Lowell H. Brown, William Crawford, Frederick Koykendall, Dr. M. F. Dearborn, Dr. Arthur Elting, R. A. Gushee, Emerson Hough, John L. Kuser, Frederick M. Spiegle, David B. Simpson, John V. Black, Charles E. Rushmore, Augustus Post, Alan R. Hawley, Henry Woodhouse and Dr. George F. Kunz.

Coast Guard Cutters to be Equipped with Anti-Aircraft Guns

Anti-aircraft guns will be placed on board the vessels of the United States Coast Guard, it is learned, the Naval appropriation estimate carrying a provision to that effect.

The Bureau of Ordnance of the Navy Department, it is stated, allows to the new vessels three anti-aircraft guns each, of three-inch caliber.

The decision to place ample anti-aircraft batteries on board the cutters is significant of the determination of the Navy Department regarding the service to be exacted of the cutters in time of war.

High Army Officers Complete Aviation Course

Col. William L. Kenly, Field Artillery; Lieut. Col. Harry G. Bishop, Eighth Field Artillery; Lieut. Col. John B. Bennett, Seventeenth Infantry, and Major William A. Burnside, Twenty-sixth Infantry, completed a six weeks' course of instruction for field officers in aviation at the signal corps aviation school at San Diego, Cal., on December 24. This is the first instruction of the kind to be given, and it is intended to make officers available for duty in executive and administrative capacities as departmental aviation officers, as commandants of aviation schools and other aviation stations, and as commanding officers of the larger aero organizations, and it is not intended to afford qualification as aviators. It is intended to conduct at the school other classes of field officers to qualify them for this work. Following completion of the course at San Diego, the officers will spend ten days with the first aero squadron at Columbus, N. M., and ten days at the aero base at San Antonio, Tex., where the Third and Fourth aero squadrons now are being organized.

Thereafter, they will be assigned to aviation duty. One of them will be assigned to duty at New York as aviation officer of the Eastern department, another at Chicago as aviation officer of the Central department and another at San Francisco as aviation officer of the Western department, and possibly the fourth will be assigned to command of the experimental and proving ground to be established at Hampton, Va.

The next course for field officers will commence at San Diego shortly after January 1 and a number of applications to be assigned to the course have been received from officers. It was planned that each class would not exceed ten officers, but the present critical conditions will undoubtedly force a change of plans.

Metropolitan Section S. A. E. Meeting

The Metropolitan Section of the Society of Automobile Engineers gave a dinner, followed by a most interesting lecture, on December 21st.

The affair was held at the Automobile Club of America. The lecture was delivered by Messrs. Elmer A. and Lawrence B. Sperry. The subject was, "The Military Aspect of the Aeroplane."

Other guests of the S. A. E. at the dinner which preceded the lecture were A. L. Riker, Alan R. Hawley and Henry Woodhouse.

Trubee Davison Co-operates with Naval Officers

Trubee Davison has been co-operating recently with the officers at the submarine base at Norwich, Conn., in the matter of locating submerged submarines from the air. On December 6th he made a flight with Lieut. John Stapler, and they were successful in locating the submerged craft.

West Virginia to be Aeroplane Mother Ship

The aeroplane ship West Virginia will be ordered from Mexico shortly to receive the finishing touches to her hydroplane launching equipment. The West Virginia was needed for Mexican service and was sent South before the pneumatic ram, which is the essential part of the aeroplane equipment, could be installed.

The ram was manufactured in Washington, D. C., after the model on the North Carolina.

The ram is designed to give the car on which the aeroplane travels the necessary velocity to send the airship off the stern. The installation of this catapult will make the aeroplane equipment of the ship complete and make her the second ship so constructed in the Navy.

Miami to be Center of Winter Aerial Activity

Will the first air voyage across the Atlantic follow the same course covered by Columbus in his voyage of the discovery of America in 1492?

By a transaction completed recently with Carl G. Fisher, Glenn Curtiss has established a United States Government Aviation Training School and Experimental Station in Southern Florida, at Miami, and will develop there the new triplane type of aeroplane, which has the capacity for establishing the first flight across the vast distances from America to Europe.

Previous to this time the winter development of the aeroplane has been largely confined to San Diego and Southern California, but Mr. Curtiss, after a thorough investigation, is convinced that Southern Florida and Miami offer far greater advantages in the way of climate, surroundings and accessibility, and work has been started for big hangars and practice fields on a large tract west of Miami, a short distance from the Everglades. In addition the world's greatest motor boat racing course in Biscayne Bay—Miami's water front—will be used in the development of the hydroaeroplane types.

The training school will be equipped and in operation within a few weeks, and United States Army aviators will make the aeroplane an added attraction for the thousands of winter tourists who visit Miami.

The fact that thousands of square miles of the Florida Everglades which have never been visited by white men are the sole possession of descendants of the Indians which first greeted the early explorers opens up great possibilities for the aviator who longs to do something new.

The aeroplanes will also be used as convoys on the January express cruiser races over the 150 miles between Miami and the Bahamas, and should provide many stirring views to the thousands of natives of the Bahamas. Many of these natives have never seen a bicycle or a sewing machine, and the sight of a big army tractor floating overhead should bring a greater novelty to the present inhabitants than the sight of the galleons of Spain some four centuries ago.

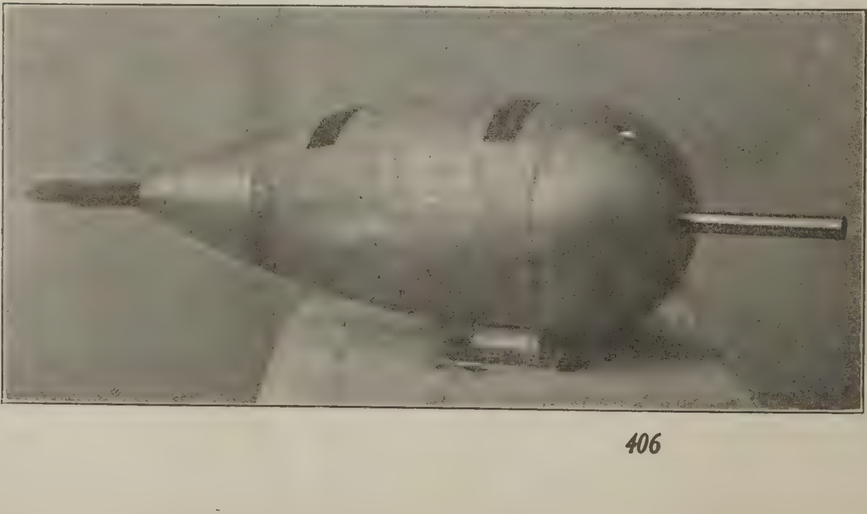
Mr. Curtiss is authority for the statement that the wonderful tropic skies of Miami open up possibilities for observations which may establish many new records during the coming winter. In the new Miami shops the work on the completion of the great new triplane tractor will be rushed, and he expects to develop a lighting and fuel capacity in the new type which will open the way to the first great transoceanic flight.

Standard Aero Club Members Visit Sperry Plant

The members of the Standard Aero Club, which comprises the engineering staff and employees of the Standard Aero Corporation of New York, were the guests of the Sperry Gyroscope Company on Saturday, December 16. They were shown through the entire plant, and tremendous interest was evinced in the special aeroplane instrument demonstrations.

San Francisco to Have Aviation Base?

According to a despatch in the San Francisco *Examiner*, Representative Kahn, of California, has been informed by Colonel Squier, chief of the Aviation Section of the Army, that an appropriation will be asked in the urgent deficiency bill for the purchase or rental of land near San Francisco Bay by the Aviation Squadron.



A generator designed by the Electric Specialty Co. for aeroplane service, wireless transmitting and receiving. It is a combination of two direct current generators, mounted in a torpedo shaped shell, one of the generators delivering low voltage for lighting the filament of the receiving audion, and the other delivers 1,200 to 1,500 volts direct current for transmission. Both armatures are mounted on one shaft and supported at both ends by ball bearings. The outfit is driven by a small propeller and weighs about 37 lbs.

Will Use Triplane in Atlantic Flight

Captain Hugo Sundstedt, of the Swedish Army, who arrived a few weeks ago from France, where he has been observing aerial developments for Sweden, will leave next month for Florida to complete arrangements for the construction of an aeroplane which he will use in his attempt to cross the Atlantic.

Captain Sunstedt said it was now practically certain that he would make the flight in May, or perhaps the last of April. He hopes to have his machine built by the middle of February, and will then spend two months making trial flights and preparing for the trip.

Captain Sunstedt is Sweden's foremost aviator and holds the record for a long distance flight between Stockholm and Paris, a distance of 1,600 kilometers, during which he was obliged to land but once for fuel. For several years he has conducted an aviation school in Sweden, but had to abandon it recently to take up the work for the Government.

Gorey Found Guilty by a Military Court

Private Frank Gorey, of the First Aero Company, New York National Guard, was found guilty of "conduct to the prejudice of good order and military discipline" by a general court-martial at Fort Totten because of an interview he gave to the *Sun* as spokesman for several members of his company. He was sentenced "to be confined at hard labor at such place as the reviewing authority may direct for six months and to forfeit two-thirds of his monthly pay for three months."

This sentence was approved at the headquarters of the Department of the East at Governors Island, but, "in view of the inexperience of the accused in the service and of the length of time he has been in confinement awaiting disposition of his case, it is remitted."

The interview upon which the charges were based was given at the Signal Corps aviation station at Mineola on October 20 and published on the following day. A few days later Gorey was arrested and has been confined at Fort Totten since then. No mention was made in the charges upon which Gorey was court-martialed of his statement that he and other members of his company had been induced to join the National Guard upon the representation that they would be taught to fly and sent to the Mexican border.

The specifications upon which he was found guilty were in effect that he made statements to the *Sun* "conveying censure on his superiors in the military service, the substance of which statements appeared in the New York *Sun* of October 21, 1916."

Modern Aero Corporation Incorporated

In a statement sent to the AERIAL AGE, the management of the Modern Aeros Corp., Ltd., of Trenton, outline their activites as follows:

"We are incorporated in New Jersey; Capital Stock, $100,000.00, fully paid and non-assessable; stockholders include some of the most prominent men in this city, including a former Governor of this State; we are at present erecting shops and hangar immediately outside of Trenton, and on the main line of the Pennsylvania Railroad; later we shall build shops on the bank of the Delaware River, in Trenton, for the manufacture of hydroplanes; our activities will, for the present, be confined to the building of the LUKACS-PEDERY-AIRPLANE, the patents on which are controlled by this corporation."

United Eastern Aeroplane Co. to Organize

Organization and incorporation of the United Eastern Aeroplane Corporation has just been perfected and business begun at 1251 DeKalb Avenue, Brooklyn, N. Y. This concern is capitalized at one million dollars, and purposes to manufacture aeroplanes for pleasure, military and commercial purposes, on a large scale.

The incorporators include all the owners of the Eastern Aeroplane Company, Inc., of 1251 DeKalb Ave., Brooklyn, N. Y., with others, and the new company has taken over the old concern. Both the factory and aviation school heretofore conducted by the old company will be continued and enlarged.

In the manufacture of their machines this corporation will use quite a number of improved devices for which patents will be secured. Some of these are already in use in the military tractor biplanes manufactured by the old company and used in their aviation school at Sheepshead Bay Speedway and they will continue to specialize on this make of machine.

Harriman Aircraft Motors, Inc.

The Harriman Motors Co., of South Glastonbury, Conn., has just been incorporated for $125,000.00 and will from now on be known as Harriman Aircraft Motors, Inc.

This company will, as in the past, manufacture the original Harriman Motor from 60 to 150 H. P. The plant for the present will remain at South Glastonbury, but will be enlarged.

Personal Pars

R. W. Judson, president of the Continental Motor Works and an aviation enthusiast, has purchased the Jarvis Harbeck summer home property near Spring Lake, Michigan, where he will erect hangars for his two aeroplanes.

William Thaw, Frederick A. Prince and C. D. Johnson left America last week to rejoin the Franco-American Aviation Corps.

Mr. S. B. Taylor, Sales Manager of the S. K. F. Ball Bearing Co., of this city, has been appointed vice-president of the company, succeeding Mr. F. B. Kirkbride, who remains on the Board of the company. Mr. Taylor will remain in charge of sales.

Mr. G. A. Ungar, former representative of the company in Cleveland, Detroit and Pittsburgh, has been appointed Technical Manager and Chief Engineer, succeeding Mr. Uno Forsberg, who returns to Sweden after completing his work of creating the manufacturing organization of the S. K. F. Ball Bearing Company in this country.

Lt. Sol. John B. Bennet, 17th Inf., from Signal Corps Aviation School, San Diego, upon completion of course at field officers' school, thence via Columbus, N. M., and Ft. Sam Houston to Washington, and report to chief signal officer for temporary duty pending assignment to permanent station.

Aviator to Take Pictures of Steinway Section

Flying over the Steinway section of Long Island City, an aviator will take pictures of the "lay of the land" within the next few weeks.

The aviator will be engaged by the Steinway-Manhattan Rapid Transit Committee, organized to urge the extension of the Astoria "L" from Second and Ditmars avenues to Steinway and Ditmars avenues.

The pictures to be taken by the aviator will be sent to the Public Service Commission, the Board of Estimate and railway officials to impress upon them the transit needs and possibilities of the Steinway section.

Steel Products Co. Enlarges All Three Plants

Following their recent acquisition of the Metals Welding Company, of Cleveland, and the Michigan Electric Welding Company, of Detroit, the Steel Products Company have entered upon extensive additions to all three plants. The new buildings and equipment will provide for increase of business, naturally resulting from the consolidation and from the fact that the one firm now supplies so large a range of requirements.

At the main plant on Clarkwood Road, Cleveland, the heat treating departments have been greatly enlarged. The system of central control of all furnaces has been perfected to a high degree, making this department the most complete of its kind in the industry.

Two large forge shops or "hot" shops units are just being completed at the same plant.

The Michigan Electric Welding plant is building to increase its capacity for machine operations on rod assembly and drag link work. They are also adding largely to their warehouse and stockroom space.

An addition of one story has been made to the Metals Welding plant on Perkins avenue, Cleveland, giving more room for the gas welding department and for the bolt department, which is producing bolts in large quantities, especially for chassis assembling.

The large production planned by leading car makers is being anticipated, and capacity is being arranged that will take care of the maximum demand.

"With The Flying Squadron"

"With the Flying Squadron" is the name given to a new volume issued by the Macmillan Company, New York, which comprises a series of letters written by the late Harold Rosher, who was a lieutenant in the Royal Naval Flying Corps. In an introduction to the volume Arnold Bennett says: "The letters which form this book were written by Harold Rosher between August, 1914 and February, 1916. They are spontaneous and entirely unstudied documents, . . . each contributing its due realistic share to the complete picture of an airman's life in war. So far as my knowledge goes, no other such picture, so full and so convincing of the air-fighter's existence, has yet been offered to the public. The book costs $1.25."

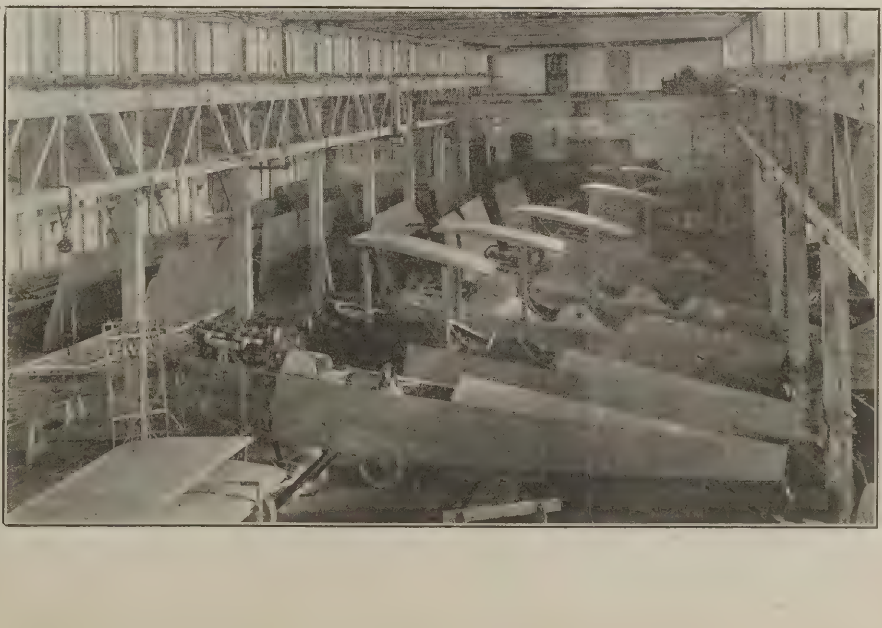
Flying Men and their Machines

"Flying Men and their Machines" is the latest book from the pen of Clarence Winchester.

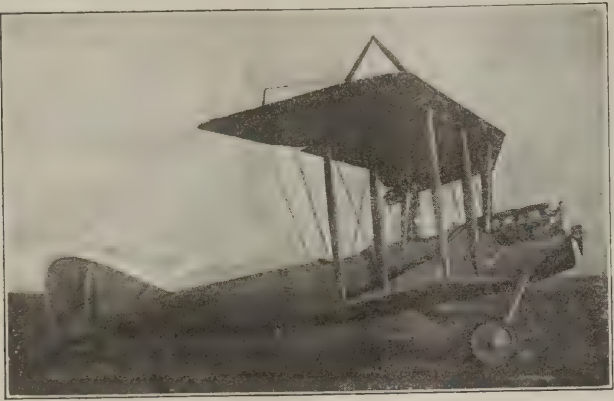
Although this book has been written by a practical aviator it is neither heavy nor technical. The illustrations include photos of all kinds of aeroplanes, Zeppelin airships over Germany, views taken from various aircraft whilst in flight, portraits of many well known aviators, etc. In fact, it is one of the most profusely illustrated books on the art of flight ever published.

In an easy manner the reader is told how aeroplanes actually fly, the why and the wherefore of the aeroplane and Zeppelin, the effect of war upon flying; and from a practical knowledge of schools of aviation the author gives some sound advice to would-be aviators on learning to fly. A very interesting chapter on a woman's point of view of the great art is contributed by Mrs. Winchester who has often flown with her husband.

The volume is illustrated with nearly 40 portraits and diagrams, and is published by E. P. Dutton & Co., at $2.50.



Interior of the factory of the Standard Aero Corporation, at Plainfield, N. J., showing assembly of machines being constructed for the War Department.



The latest tractor biplane constructed by the L. W. F. Engineering Co., which is now at the aviation grounds, Mineola, L. I., where the company has hangars.

Giant Air Yacht Wrecked in a Gale

The great flying yacht of the American Transoceanic Company was wrecked December 22nd afternoon by the gale which blew in from the sound and swept the hangars and aviation headquarters at Port Washington, L. I.

The hydroaeroplane was on the shore near the hangar, which was in process of erection. The machine was tied by twenty ropes to heavy stakes, driven deeply into the ground. The mechanics and others at the aviation camp were busy packing up for their migration to Miami, Fla., where the company has its winter quarters, when it was noticed that the wind was rising. Mechanics inspected the ropes holding the great flying yacht down and satisfied themselves that it was safe.

It was not until nearly dark that the wind increased until it was blowing at the rate of nearly seventy miles an hour. The new hangar was trembling with its force, and suddenly tore loose from its foundation and went end over end inland, where it finally broke to pieces.

Then the flying yacht tore loose from its moorings, rose in the air, and came down with a crash. The mechanics tried to catch the dragging ropes, but before they could reach them the wind turned the machine over and over, and practically tore it apart. The mahogany hull was demolished, the wings torn to shreds, and the two 100-horsepower motors thrown to the ground. In addition, practically all the scientific instruments were wrecked. In less than three minutes the flying boat was reduced to a shapeless mass.

Personal Pars

As soon as weather conditions will permit Herbert Munter will pilot the hydroaeroplane of the Pacific Aero Products Company from Seattle to Portland.

Orvar Meyerhoffer, of San Diego, has a method of fishing that excels probably all others ever tried. Meyerhoffer locates the fish before he fishes for them, a feat which, unfortunately, many anglers are unable to accomplish. He is an aviator and has a hydroplane. By flying some 500 feet above the calm waters near Catalina Island he can see where the fish are schooled. He then alights some way off and drifts slowly over the schools. A boathook holds the hydroplane in place and the aviator experiences all the thrills of fighting albacore with light tackle.

Joseph A. Steinmetz, Robert Glendinning and Clarke Thomson will be the delegates to the conference of the National Security League at Washington in January, representing the Aero Club of Pennsylvania.

Curtiss Aeroplane Corporation Sells Notes

Curtiss Aeroplane & Motor Corporation has sold to a banking syndicate $2,000,000 one to five-year serial prior and convertible 6 per cent notes, due in equal annual instalments from January 1, 1918, to January 1, 1922, inclusive.

The corporation has also sold to private interests $2,000,000 6 per cent gold notes, due January 1, 1926. Both issues are callable at 102½.

Purpose of this financing is to refund $1,000,000 of notes falling due January 1, $1,000,000 due April 1, and $1,000,000 falling due July 1, 1917.

Holders of the April 1 notes will be offered privilege of depositing their notes for payment at 102½, after January 2, 1917. The July 1 notes will be offered the same privilege, and notes not exercising that privilege will be called for payment on April 1, according to the terms of the call privilege contained in the notes.

Regular semi-annual dividend of 3½ per cent on the preferred stock has been declared, payable January 15 to stock of record January 1.

Greetings from Air Sent to Aero Club

Charles Reed, banker and aviator, combined his hobby with the spirit of the season December 24th by sending Christmas greetings to his friends at the Aero Club by aeroplane. Hundreds saw him high in the air over the home of all New York aviation on Madison avenue, his machine circling and curtseying to the little knot of flying enthusiasts who crowded out on the club's balcony to acknowledge his salute.

Mr. Reid, who holds both the Aero Club expert and the United States Reserve military licenses, was out for a spin from the hangar on Governor's Island about 2 o'clock in the afternoon when he conceived the idea. He shot up over the East River bridges, turned in at Forty-second street and circled south-westward to the club. There he cut a number of spirals and "figure eights" until a lone watcher at the club window spied him and called the rest.

President Alan R. Hawley, Henry Woodhouse and a number of others came out and waved back to him. Then Mr. Reid turned back, circled over the Statue of Liberty, and turned his machine in at the hangar.

Memphis and Nashville Considered for Aviation School Sites

Captain J. C. Morren, in charge of aviation at Ashburn Field, Chicago, recently visited Memphis and Nashville to examine sites considered by the local authorities as being suited for aviation school purposes.

Souther Says Motor Trouble Is Thing of the Past

That the Aviation Section of the U. S. Army is beginning to get actual results from its efforts to improve aeroplanes was testified to by Mr. Henry Souther, one of the two civilian experts in motor engines attached to the War Department, before the House Naval Affairs Committee. "There are machines flying to-day," he said, in response to an inquiry as to whether they had gotten a motor that could run over three hours and be reliable, "in the 1st Aero Squadron at Columbus, N. M., that do fly continuously for five and six hours." He also said, as an illustration of the improvements in the Regular Army's motors, that at Columbus, where the machines fly forth from General Pershing's headquarters every day, there are no serious breaks in the machines nowadays.

Signal Corps Orders

Capt. Henry H. Arnold, S. C. (first lieutenant, Int.), will report in person to the president of the examining board at the Signal Corps Aviation School, San Diego, Cal., for examination for promotion to captain of Infantry. (Dec. 8, Western D.)

Par. 32, S. O. 185, War D., August 9, 1916, relating to Capts. Frank P. Lahm and Benjamin D. Foulois, aviation officers, S. C., is revoked (December 14, War D.)

Capt. Shepler W. FitzGerald, junior military aviator, S. C., to Mineola, Long Island, N. Y., for duty. (December 14, War D.)

Capts. Edgar S. Gorrell and Harold S. Martin, junior military aviators, S. C., now on duty at the Massachusetts Institute of Technology, Boston, Mass., will proceed to Plainfield and Nutley, N. J., and Ithaca and Buffalo, N. Y., for temporary duty at the plants of the Standard Aero Corporation of New York, the Aeromarine Plane & Motor Company, the Thomas Brothers Aeroplane Company and the Curtiss Aeroplane Company, respectively, and upon the completion of duty return to Boston. (December 15, War D.)

Capt. Virginius E. Clark, junior military aviator, Signal Corps, to Hampton, Va., for temporary duty in connection with the aviation service. (December 20, War D.)

Kite Balloons for Naval Maneuvers

The U. S. S. Nevada and Oklahoma are being equipped by the Navy Department for testing kite balloons for spotting purposes this year at Guantanamo, according to a statement made by Capt. Josiah S. McKean, U. S. A., before the House Naval Affairs Committee. They will cost from $4,000 to $6,000 each, will carry two men each and will be about 75 to 80 feet in length and 30 feet in diameter. The hydrogen gas, with which they are charged, will be carried in tanks on board the ships. Captain McKean said we have in the Navy at the present time the following aircraft: One dirigible, three kite balloons and nineteen aeroplanes and seventy-seven under contract, but not delivered.

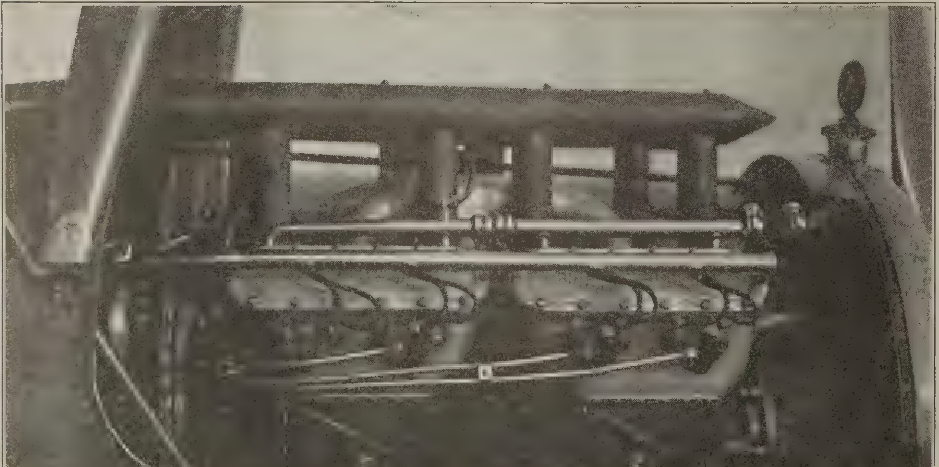
Army and Navy Orders

First Lt. J. C. Morrow, Jr., aviation officer Signal Corps, from Memphis to Nashville, thence to Hot Springs for temporary duty aviation service of army and upon completion return to proper station at Chicago.

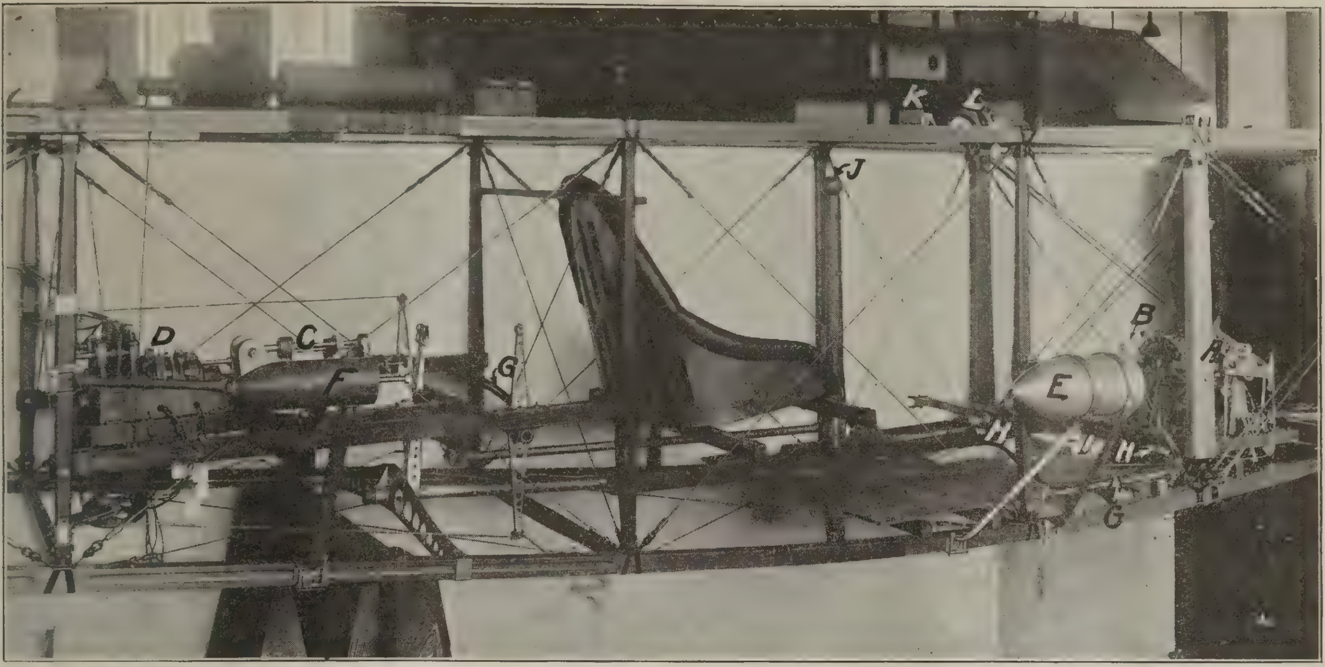
Second Lieutenant E. A. Coffin, Coast Guard, appointed student aviator.

Third Lieutenant Robert Donohue, Coast Guard, appointed student aviator.

Capt. J. L. Jayne, detached Naval War College, to commandant of Pensacola aeronautic station.



The mounting of the Thomas motor in the L. W. F. tractor. As will be noted in the upper illustration, the motor placement is very efficient, carrying out the streamline effect of the laminated fuselage.

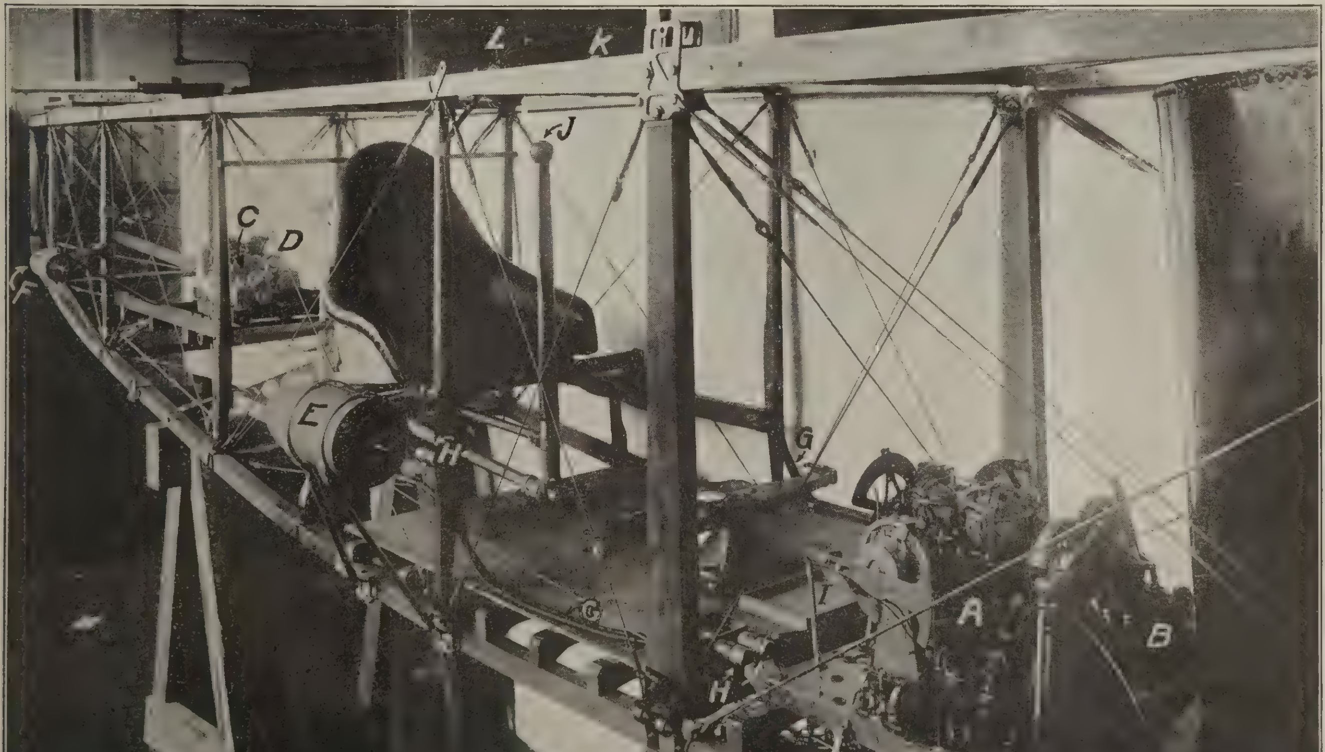


AUTOMATIC PILOT INSTALLATION IN TWIN MOTORED HYDRO-AEROPLANE

The specifications for twin-motored hydro-aeroplanes recently issued by the Signal Corps, U. S. A., request a bid to include the installation of a device for the automatic stabilization of the machine. Anticipating the needs of the Army and Navy for a machine gun of this kind so equipped. The Sperry Gryoscope Company have built one of their Automatic Pilot Installations into a Twin-Motored Curtiss Model R Tractor, with 100 H. P. motors. This installation should prove interesting to all designers who intend to bid on the Signal Corps Twin Hydros.

Plates 1 and 11 show the location of the various units with regard to that of the pilot's seat. The gyro units, *A* and *B*, controlling the directional as well as the lateral and longitudinal stability of the machine, are mounted on cross members in front of the pilot, readily accessible for inspection and adjustment. The pilot is thus enabled to use the indications shown on the main gyro unit when flying manually, instead of liquid or other lateral and longitudinal inclinometers. The servomotors, *C* and *D*, moving the control surfaces of the machine as directed by the gyro units, are placed on a skeleton platform directly behind the pilot's seat, adjacent to the actuating levers of the flippers and alierons, and in the line of the rudder wires. The generator, *E*, for supplying the current necessary for the operation of the apparatus, as well as the servomotor drive, *F*, are fastened to the side of the fusilage, where their wind turbines will be in the slip stream of one of the propellers.

(*Continued on page* 418)



SPERRY TAKES STEPS TO SUPPLY MUCH NEEDED AERONAUTIC MAPS

Presents Admiral Peary, Chairman of Committee on Aeronautic Maps and Landing Places of Aero Club of America With Maps of Long Island and New York-Chicago Route

Map showing Long Island with the landing places for aeroplanes, prepared under the supervision of Lawrence B. Sperry and presented to Rear Admiral Robert E. Peary, chairman of the Committee on Aeronautic Maps and Landing Places of the Aero Club of America. The route is drawn in a straight line from the point of start to the terminal. The next step will be to insert the landing places, which will be painted in red and shown in their exact shape. The plan is to show on the map also the landing places for twenty-five to fifty miles either side of the straight route, and eventually to give on the map sketches of the shape of cities and towns, or the most prominent land-marks which strike the eye of the air-traveler.

Map for Lincoln Airway Being Prepared

A map is being prepared of the Lincoln Airway, which Lieutenant-Colonel Squier has urged the Aero Club of America to establish in connection with the Transcontinental Aeroplane Contest, for which the club has set aside $20,000 for prizes. It will show a straight route from New York to San Francisco, but there will be lines leading from the main line to central landing places like Erie, Cleveland and Detroit. Erie has already offered $10,000 for prizes for the Transcontinental Aeroplane Contest, and is ready to establish a suitable landing place for aeroplanes.

All the headings are magnetic on these maps, and the arrows indicate headings in either direction. Conventional signs will be adopted later after thorough consideration.

The true heading from one city to another is determined by projecting the line of flight between those two cities and then transferring this line by means of parallel rulers, to the nearest compass rose, from which the true heading is obtained. As the difference between the geographical and magnetic North Pole differs at various places on the earth's surface, it is necessary to correct frequently for this difference, which is known as "variation." In the vicinity of Chicago it will be noticed that the magnetic needle is found to point to true geographical north, and as the journey is continued eastwardly the error will be noticed to increase to almost 10 degrees westerly at New York. As all of the headings on this chart have been laid out "magnetic," or with the variation taken into consideration, the pilot simply steers his craft on the charted headings. It will be noticed that wherever the variation is easterly, it is necessary to subtract from the true heading, and where westerly it is necessary to add the necessary number of degrees in order to get the proper indication.

Training Aviation Personnel

The army aviation educational and training system is being developed along wide lines that will afford a qualified personnel of regulars and reserves for the military establishment. At present the army has its own aviation schools at San Diego, Cal., Columbus, N. M., San Antonio, Tex., Chicago, Ill., and Mineola, N. Y., and it has arrangements whereby men are sent for training to the Curtiss Aviation School at Newport News, Va., for qualification for appointment as officers of the aviation section of the signal officers' reserve corps. It is planned, besides that at Mineola, to establish another aviation station on Long Island

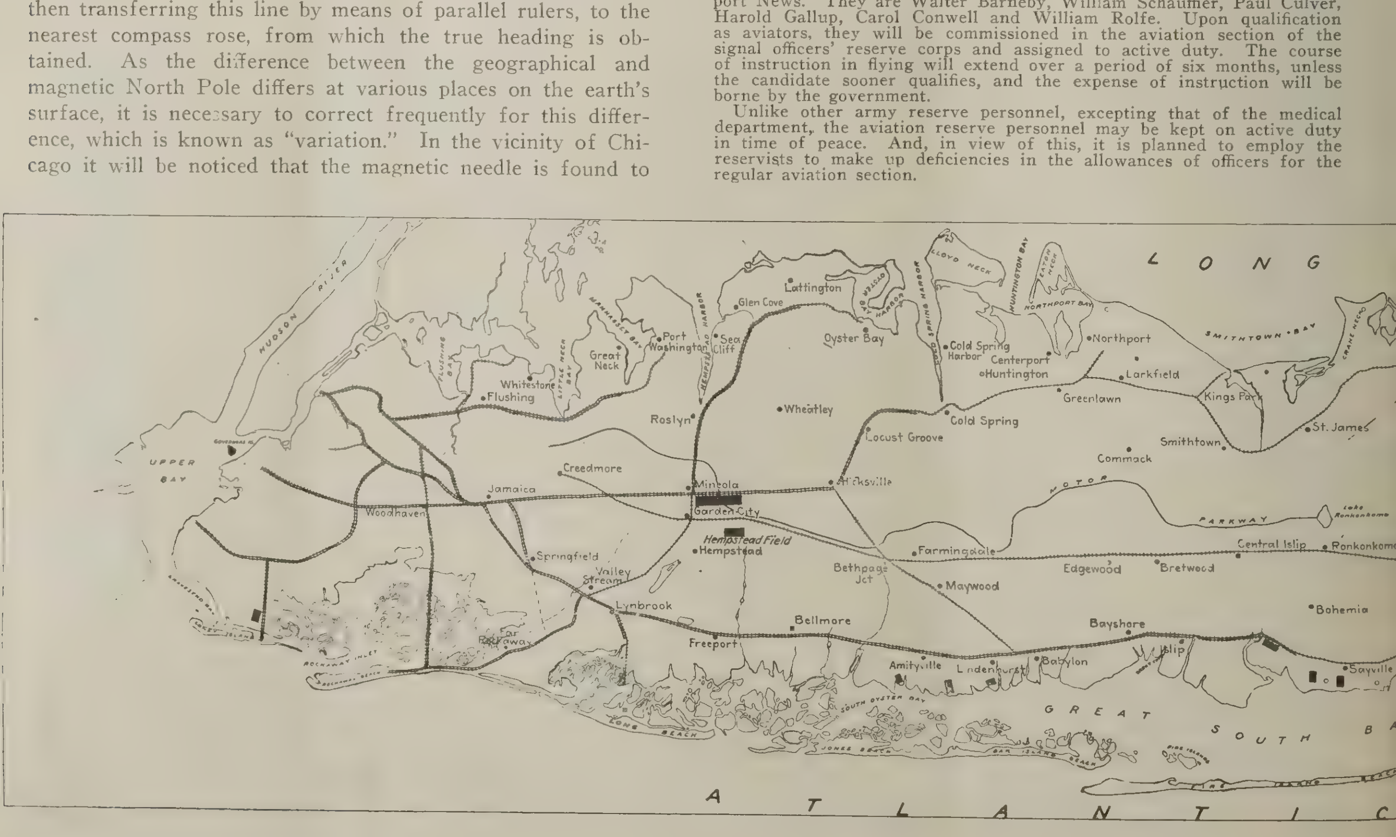
Arrangements have been made for the army to take over the private aviation school conducted by Robert Glendenning at Essington, near Philadelphia. The station has facilities for training between 20 and 30 students. Mr. Glendenning will be made a major in the reserve corps and placed in command of the school, and Sergt. William C. Ocker, of the signal corps, a qualified aviator, who recently made the sensational flight from Philadelphia to Washington with a congressional representative-elect, will be made a captain in the reserve corps and assigned to duty at the school.

Glenn Curtiss is about to start a flying school at Miami, Fla., with facilities for training 50 student aviators, and the army will send there for training a number of candidates for commissions as aviators in the reserve corps.

The aviation training facilities available to the army will be taken advantage of for the training of those that pass the examination for appointment to the aviation reserve corps. About four candidates a week are being examined at Washington, besides those examined elsewhere in the country.

The first of the reserve personnel authorized by recent army legislation, aside from those of the reserve personnel of the medical department, to be assigned to active duty, are six student aviators recently appointed sergeants in the aviation reserve, and assigned to instruction at Newport News. They are Walter Barneby, William Schauffier, Paul Culver, Harold Gallup, Carol Conwell and William Rolfe. Upon qualification as aviators, they will be commissioned in the aviation section of the signal officers' reserve corps and assigned to active duty. The course of instruction in flying will extend over a period of six months, unless the candidate sooner qualifies, and the expense of instruction will be borne by the government.

Unlike other army reserve personnel, excepting that of the medical department, the aviation reserve personnel may be kept on active duty in time of peace. And, in view of this, it is planned to employ the reservists to make up deficiencies in the allowances of officers for the regular aviation section.



MILITARY AVIATION*

By Brigadier General George P. Scriven, Chief Signal Officer of the Army

The concentration of the forces composing the punitive expedition to Mexico marked a distinct step in miltary aviation in the United States. It was the first time this branch of the service had been called upon to put a tactical unit into the field. There was only one such in the service, namely, a small squadron, the First, at San Antonio, Tex. This, while equipped with as good material as could be obtained at the time, had only eight low-powered machines. These machines at the time of their transportation to Columbus had been in service for many months. The altitudes encountered in Mexico, up to 12,000 feet, the vast distances to be covered, and the lack of cultivated areas and resources in general made this theater one of the hardest to operate in which any army had ever entered. The few machines were rapidly used up, although they did a great amount of flying and rendered extremely valuable service to the punitive expedition.

The urgent deficiency act of March 31, 1916, gave the aviation section of the Signal Corps $500,000, the greatest sum up to that time that had been appropriated at any one time for aviation in the Army. A board of officers of the aviation section, who were experts in the construction and purchase of material, was assembled at Washington and consulting engineers of the highest caliber obtained. This board recommended certain types of material to be bought, and as a result, a squadron equipment of twelve 160-200 horsepower military tractor biplanes was purchased and delivered to the aero squadron with the punitive expedition in Mexico. Other material was purchased for the squadron, so that it gradually becaem a splendidly equipped organization complete in all details, that is, aeroplanes, motor trucks, portable machine shops, automatic photographic cameras, machine guns, shoulder rifles, bombs and other accessories.

In spite of the success obtained in organizing and equipping this first squadron, although, indeed, much time and effort has been required to do so, it appears that even up to the present time the state of the art of aeroplane construction in this country is not satisfactory and it is still impossible to obtain suitable material in large amounts on short notice. Due also to the entire difference of the theater of operations of the American Army in Mexico from the European theater of war, the aeroplanes required in the United States must be of a quite different type. Many things relating to them remain to be learned and worked out before an entirely satisfactory machine is obtained.

One deficiency which made itself very apparent was the propeller difficulty that was experienced in the high altitudes and dry atmosphere of northern Mexico. For a while the difficulty of keeping propellers in condition and obtaining suitable ones nullified the operations of the squadron. This, however, proved in the end to be an advantage, because experience was gained in the construction of propellers that could have been obtained in no other way. All sorts of propellers were ordered, a propeller-making plant established at Columbus, and engineering talent all over the country enlisted in the solution of the problem. The results have been good, and the squadron is now in service condition. Indeed, it is reported that aeroplanes are habitually carrying the mails from Columbus to the commanding general's headquarters at Colonia Dublan some hundred miles away, the distance being covered in about 65 minutes.

As to the general development of material, the technical aero advisory and inspection board of the Signal Corps, assisted by consulting engineers, has sent out specifications for various types of aeroplanes, has assisted manufacturers in the design of equipment of all sorts, and has availed itself of all sources of information—the Bureau of Standards for the test of material, the opinions of distinguished engineers, and the actual trial of various devices in the air. In addition, aeroplanes of the latest type have been ordered from abroad.

An inspection department, composed of civilian engineers, has been organized and distributed among the various factories that are manufacturing aeroplane equipment for the Army.

The field of inspection not only embraces the manufacture of all sorts of heavier-than-air equipment for the aviation section, but extends also to the units in the field and to the determination of what materials must be obtained in advance for possible emergencies.

An aerostatic division has been established in the aviation section. Its organization is now going forward and recommendations have been made that the first balloon school be established at Fort Omaha, Nebr. A large balloon shed, a hydrogen gas plant, and other equipment is already there. Captive balloon organizations will be equipped as soon as practicable and instruction with training dirigibles will be inaugurated.

The aero company in the Philippine Islands has been maintained as originally planned, and is gradually building its quarters, hangars, and equipment. It still has the old equipment of aeroplanes which will be replaced as soon as possible.

The Signal Corps Aviation School at San Diego, Cal., has continued to turn out expert military aviators, and, it is believed, that the principles of flying, as taught at this school and evidenced by its graduates, are second to none. A field officers' course in aviation has been established here in accordance with Paragraph V, Bulletin No. 35, War Department, September 13, 1916. There are at present 45 officers of the Army undergoing instruction at this institution, which is the greatest number that has ever been on duty at that place at one time. In addition, two officers of the Marine Corps are being trained and some enlisted men.

The matter of the location of the aviation school, to be permanently established in California, is receiving consideration, and a site will be purchased in the near future.

The site for an experimental and proving ground is now being selected and will be purchased as soon as a decision is reached. A proper site which fulfills all the conditions is quite difficult to obtain. It must be located near manufacturing centers, have water enough so that the firing of all sorts of ordnance and the dropping of explosive missiles may be carried on. It must be near railways, comparatively flat, and well drained.

The project for the development of the aviation section contemplates 7 aero squadrons for the Regular Army, 12 squadrons for the National Guard Divisions, and 5 for the defenses on both coasts besides aerostatic units for the mobile Army and Coast Artillery. The personnel for these will be made up from the Regular Army, both officers and enlisted men, of officers and enlisted men of the Reserve Corps, and of National Guard units. To train this personnel, the facilities of the civilian aviation schools will be utilized to their maximum, and finishing schools for such personnel have already been established and are being maintained at Chicago in the Central Department, and Mineola, Long Island, in the Eastern Department, by the aviation section. The tentative system to be followed in the general organization of the aviation section is as prescribed in the General Orders No. 55, War Department, 1916, which is as follows:

(Here follows the terms of Order No. 55. which was printed in Aerial Age for October 23.

The plans for the equipment of our foreign possessions with proper aero units are being carried out. The equipment for these units consists of hydoaeroplanes. Suitable ones are very difficult to obtain, but specifications covering high-powered machines of this character are now being sent out, and it is hoped within the near future to have adequate equipment along this line.

It is believed that the arrangements will result in a growth of this branch of the service, which will not only be rapid, but which will be based on such sound principles as will be able to stand the test of any emergency. The field is an entirely new one for the United States Army, and there is no precedent to follow. As a result, therefore, it can not be foretold with certainty what time will be required to train personnel or develop material. Every known agency, however, for the development of both of these elements is being made use of in this country.

However, the experience gained in this country and the reports received from abroad indicate that a number of changes and additions will be necessary in any contemplated organic law for a separate air service, but the Chief Signal Officer stands ready to submit recommendations for such changes whenever the question is taken up.

The plan of the General Staff, approved by the Secretary of War, contemplates, and as I think very properly, the eventual separation of the aviation service from the Signal Corps. The separation of this service from any technical corps should take place when the air service is capable of standing alone. This time has not yet come.

In conclusion, I desire to report that all of the recommendations contained in my last annual report have been carried out with the exception of those relating to a detail system of officers for the Signal Corps, additional pay for enlisted telegraph operators, and increased salary for the position of chief clerk. These I renew and urgently recommend favorable action.

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* Excerpts from General Scriven's Annual Report.

CONSTRUCTION AND OPERATION OF KITE BALLOONS

By RALPH H. UPSON

(Continued from page 365)

Laying Out.

1. Fill about fifty bags three-quarters full of dry sand (tied shut). Spread out the ground cloth on a leeward side of the pulley with the narrow edge about 5 feet from the pulley. Place two or three sandbags on the windward edge and peg down the corners.

2. Unroll the balloon, starting one foot from the pulley end of the ground cloth. When unrolled it should be like top up and head into the wind.

3. Anyone required to walk on the balloon should either take his shoes off or protect them by tying sandbags over his feet. Spread a cover over the balloon whenever possible to protect it from the sun.

4. Tie the nose rope to the main pulley post. Pull the other ropes out to the side. Put a screw stake or small dead man opposite each maneuvering rope at the edge of the ground cloth (three on each side). Give each rope one-half hitch through the eye of its stake and tie with a slip knot. Drive two wooden stakes (about 2 inches by 1 inch by 2 feet) on each side about 20 feet from the balloon, to which are attached the central and rear suspension groups by means of scrap rope tied to the concentration rings. Arrange a few sandbags to hook into the suspension.

5. Thread the main cable through the pulley and attach to the bridle. Tie a conspicuous rag 8 feet below the upper splice of the cable. Lock the winch leaving the cable just slack.

6. Put the slack of the valve cord inside its gland to within a foot of the loop. Tie the gland about 4 inches from the end, and then tie it again through the loop with breakable cord about 2 inches from the top of gland. Note: The cord (not the gland) should come loose at a pull of about 40 pounds.

7. Push the rip cord up into the appendix and tie a smooth weight of about 1 pound to the lower end. Pull the appendix out to the side next the gas supply, keeping out all twists.

8. See that the valve seats tight all round. It should start to open with 30 pounds' pull. Pack the stuffing boxes tight. Disconnect the valve cord (white) from inside the valve hole and attac hto the valve. Screw in the valve and put on the cover in a vertical position. Tighten up the screws again after a few hours. Note: The stuffing boxes together with a bridle attachment on the balloon diaphragm are provided in case it is desired to use an automatic wire for discharge of gas. This has been the prevailing practice in Europe, but after exhaustive tests we recommend in preference the method hereinafter described.

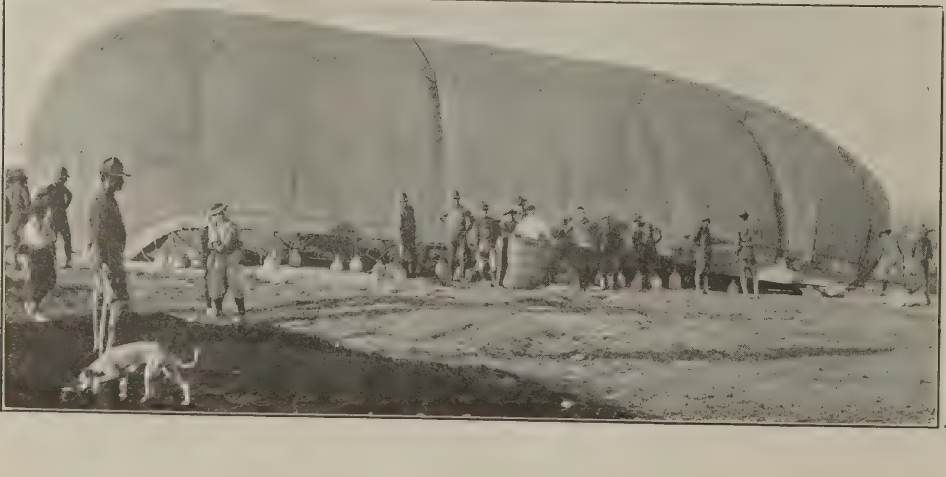
9. See that the manholes are properly (securely) closed. The gas manhole must be fixed to pull out from below. The lacing over the air manhole may be left till later.

10. All preparations will have to be made with unusual care if there is much wind. If possible, postpone inflation if the wind exceeds 20 miles per hour.

Inflation (by Bottles)

1. Lay 12 bottles side by side in a row with the nozzles about 1 ft. apart and pointed up. Lay the manifold above (on its stand) and put 1 man on each of the six branches. Attach the manifold at every other bottle. Each man after discharging his bottle takes the next full one. As fast as the bottles are emptied they are replaced with full ones by other men, 2 on each bottle. Put the caps back on the empty bottles and mark to distinguish the empty bottles from the full ones. In discharging a bottle, open the valve slowly as far as it will go. After the gas has apparently stopped it will start again after a few seconds. Leave the connection on till after it has done this twice. Then give the word and all quickly shift to the next bottle. The whole operation should not take more than 3 minutes for each set of six

The circular dots show the sand bags, used for holding the balloon in position, as seen from the ascended balloon.

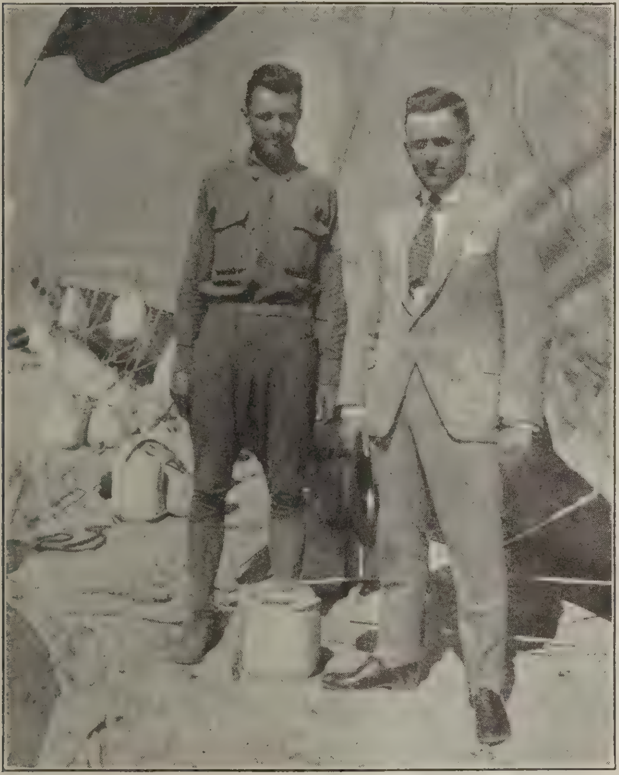


About fifty bags of dry sand, three-quarters full, are used in the "laying out" stage of inflation. Not more than two bags should be attached to each suspension patch.

bottles. In cold weather a bottle must be opened more slowly to prevent "freezing up."

2. Let out on the maneuvering ropes as the balloon inflates. The fabric should be kept just tight enough to prevent flapping and caving in from the wind. Hand sand bags in the suspension if necessary. Do not exceed two bags on each suspension patch.

3. Before the balloon is full, let a little air blow into the balloonet. Then test the safety valves by filling the balloon with gas. When the air is all forced out put still more gas pressure in and see that the balloon pressure indicator works properly. This should open after the air is all out and when the fabric is just tight enough to sound like a drum when hit with a pencil. Try the gas valve to see that it opens and seats properly. See that the small cord running down from the gas man hole is securely tied into the suspension by slip knots.



Fitzgerald, of the Goodyear Co., who did valuable work at El Paso, with the kite balloon presented to the National Guard by the Goodyear Co.

4. Let the balloon up about 5 ft. from the ground. Disconnect the inflation tube. Let the rip cord out and put back enough slack inside to bring the upper loop about 1 foot below the opening. Tie a breakable cord through this loop to the appendix opening cord. Tie another breakable cord to the second appendix opening cord through the second loop and through the toggle on the balloon at the front of the keel. This should bring the appendix flat up against the balloon. Each closing cord should pull loose at about 40 lbs. Look in the window and see that the inside cords are in order.

5. Attach the basket and pull the dampening (lower) rope around until the toggle is centered over the basket. See that the tackle is free from twists. (See special instructions on folding the parachute.) Connect up the observing and signaling apparatus. Put 1 bag of sand (tied up) in the basket. Tie the end of the tail cup adjusting rope to the concentration point above the basket. Bring down the valve and rip cords through their respective rings on the upper ropes, and tie just within reach.

6. Attach 3 tail cups to loops closest to the balloon. See that the tail cup bridle pulls free without twisting.

Ascension

1. All men at their posts (ground position) observer in the basket. Release the holding ropes from the concentration rings, and remove all bags. Untie all maneuvering ropes at the stakes and pull taut. All men pull ropes from position near their respective screw stakes. Then wait for a lull in the wind, and at the command "play out" the balloon is let up gradually.

2. The winch is kept locked until all the load is transferred to the cable. If the command to shift is not given sooner, the air position is taken gradually (without command) as the forward ropes go out of reach. Then the ropes are pulled out of the stakes and as far as possible to the sides. The object of this is to prevent yawing or side pitching as the balloon ascends.

3. Let the cable out until the basket just clears the ground. Then at the command "Drop Basket" the men at the basket let go and scatter to the help of any posts that need them most. The cable is played out, and the men at the rear ropes follow, just enough to keep the balloon from pitching. The ropes must be played out in this way to the very end (fast if there is much wind). Then at the command "Ready," "Let Go," *everyone* let go at once. If instead of "Let Go," the command "Slack" is given, the ropes may subsequently be let go, without further command, as they go out of reach. Simultaneous with this command the cable is let out fast for about 100 ft. and slowed up very gradually to a normal speed. Until this point has been reached all men stay under their ropes as closely as possible so as to seize them again if necessary (when the command is given).

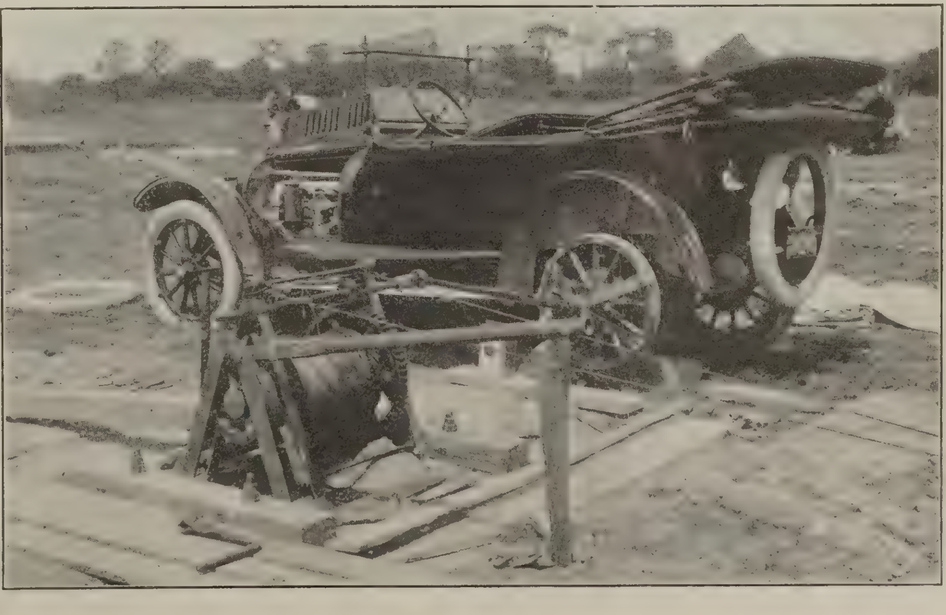
4. Do not let the average speed of ascent exceed 500 ft. per minute unless the valves are set to open easier. When the balloon is sent up for the first time, it is better to limit the speed to 200 ft. per minute.

5. The man in the basket must watch the pressure indicator while ascending. If it opens, let out gas until it closes again. After once attaining the working altitude the pressure may be disregarded unless the sun suddenly comes out warm.

6. Experience is the best guide to the proper angle of tilt

(*Continued on page* 418)

An ingenious method of using the motive power of an automobile for operating a winch that lowers the captive kite balloons.



FOREIGN NEWS

CHILE

The publication *El Mercurio* of Santiago, in the issue of October 18, states that a bill has passed the House of Representatives of the Congress of Chile recommending that an item be included in the budget placing 50,000 pesos (about $7,500) at the disposal of the President of the Republic for a medal and cash prize to the first Chilean aviator who crosses the Andean range between 31 and 35 previded no foreign aviator has made the trip previously. The bill requires the approval of the Senate before becoming operative.

FRANCE

Adjutant Bert Hall, one of the Americans in the French aviation corps, has started for Rumania, where he asked to be sent when the American aviators were at Bar-le-Duc.

Hall will be prompted to the rank of Sub-Lieutenant, as will any aviators who volunteer for foreign service.

Captain de Beauchamp, the aviator who bombarded Essen and Munich, and whose death has just been announced, on one occasion dropped bombs on the headquarters of the German Emperor, according to the *Petit Journal*. The exploit was carried out in April, 1915, when the Kaiser was stationed at Mezieres-Charleville. The paper says that the bombs fell right on the house in which the Kaiser's staff had its offices, and that as a result the Kaiser withdrew six miles from the city.

Bettina Freeman, a young operatic star, devised a novel way, according to current report, of testing her fiance, Robert Thorpe, a young aviator. She must have been moved by the spirit of "When Knights Were Bold" when she permitted her husband-to-be to enlist in the American Aviation Corps in France to prove his worth. Reports say that "he did enlist, covered himself with glory and is now on his way to America to claim his bride."

It has been confirmed that Adjutant Dorme brought down his seventeenth enemy aeroplane on December 4th. The machine fell from a height of 600 yards at a point near Monsen Chausee. The same day Sergeant Vaillet brought down his seventh machine, which fell from a height of 700 yards at a point east of Beugny.

Paul Rockwell, formerly of the Foreign Legion, and brother to Kiffin Rockwell, the American aviator, who was killed on the French front, on December 20th married Jeanne Leygues, daughter of Georges Leygues, former Minister of Public Instruction. The ceremony was quiet, as both families are in mourning. The witnesses for the bride were Paul Deschanel, President of the Chamber of Deputies, and General Duport; for the bridegroom, Vicomte du Aneloux and Sergeant McConnell, an American aviator with the French army.

Paul Rockwell and Mlle. Leygues were married by civil ceremony on December 2 in Paris. The witnesses were the same as those who acted at the religious ceremony.

Lieut. Guynemer, who, according to a Paris despatch, has accounted for 21 of the enemy's air scouts. It will be noted that the aeroplane is very effectively streamlined in the vicinity of the rotary motor, and made bullet proof by steel cowling.

Rockwell went to France with his brother at the beginning of the war and enlisted in the Foreign Legion. He was retired eight months afterward because of injuries suffered in the trenches. On his recovery he took up aviation, in which his brother Kiffin had already made a name for himself.

Paul Rockwell is twenty-seven years old. His bride is twenty-two. With her sister, she will inherit the bulk of the immense fortune left to her father.

Paris, December 21, 2:20 P. M.—The French official statement of the progress of hostilities, given out this afternoon by the War Office, says there has been relative calm on the front in France, with the exception of aerial activity. The text of the communication follows: "The night passed in relative quiet along the entire front. On the Somme front four enemy aeroplanes have been brought down by French pilots. The first came to earth near Malincourt, the second in the environs of Cléry, the third near Devise, while the fourth was brought down at a point to the south of Pouy-le-Grand by Sub-Lieut. Nungesser. This makes twenty-one the total number of enemy aeroplanes brought down by this aviator.

"Another one of our pilots, pursuing a German machine, collided with his adversary. Both machines crashed to the ground.

"During the day of December 20 forty-eight shells were thrown down upon the railroad station at Anizy. The evening of the 20th French aviators threw down 480 kilos (about 1,000 pounds) of projectiles upon the railroad stations at Brieulles-sur-Meuse and Charliuil-le-Lezières. The same evening eleven French aviators sallied forth and threw down forty-seven shells of 120 milimetres each upon the railroad station and the barracks at Nesles and also upon certain convoys marching behind the lines."

GERMANY

The *Berlin Zeitung und Mittag* publishes a message dispatched on a post card from Chicago on November 2 and just received in Berlin.

The card was carried from Chicago to New York by aeroplane and thence to Bremen on the submarine Deutschland.

GREAT BRITAIN

A day of sunshine—a rarity in December on the British front—recently caused a temporary revival of activity among the aviators, presenting a spectacle which a few years ago could have lived only in the imagination.

Out of the distance there came early in the day a series of black specks which gradually grew until they took the form of German aeroplanes. From points of telescopic observation their approach had been signaled long before even the first tiny dots were visible to the naked eye. British guns were ready and British airplanes were already climbing above the ruins of the shell torn Flemish town to challenge the invaders.

While the German machines were still over their own lines the British anti-aircraft cannon, known as "Archies," began to speak. There was a sharp, angry crack. A moment later a shrapnel shell burst into a white puff ball just in the path of the oncoming airplanes. At first the white fleck of powder smoke seemed no larger than a pinhead, but it soon spread until it appeared as an exaggerated toy balloon and floated as lazily against the sky. Then there was another puff, and then another, until it seemed that half a hundred "Archies" must be going, and the sky became a fretwork of white smoke balls, each one making a spot where a breaking shell had showered its leaden bullets upon the fast traveling Germans.

Plugging in and out among the exploding shrapnel, the approaching aeroplanes left a trail of these flecks and powder puffs in their wake. Up and up, through the danger zone of their own guns, the British aviators climbed eagerly to the fight. The distant hum of the hostile motors could now be heard, mingled with the louder, beelike drone of the English machines, and between the scarcely perceptible intervals of the "Archies'" fire came the staccato notes of the machine guns. The British airmen had opened fire before reaching the level of their adversaries.

Now the British machines began to close in from various directions and the invaders turned suddenly and started for their own lines. Their somewhat precipitate retreat was marked by the same trail of shell fire as had been their approach. The British aviators pursued, but, having in this instance the distinct advantage of height and a diving start for home, the Germans temporarily got away. This was the first phase of the day's battles in the air—a prelude to the later fighting, when two German machines came crashing to death in spinning nose dives.

Ethel Levey, the actress and former wife of George M. Cohan, was married at the Registrar's office in London to Claude-Graham White, Flight Commander in the R. F. C.

The bride was billed to appear in a new Harry Lauder review, but the opening was postponed on account of the wedding.

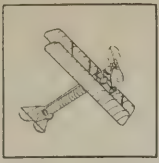
Viscount Torrington, a Lieutenant in the Royal Naval Volunteer Reserve, is officially reported missing. Shortly after the war he entered the flying corps, and his death removes a great sportsman from English racing circles, for he was very well known as a race horse owner. He was a page of honor to Queen Victoria, and King Edward the Seventh. In 1909 he visited the United States.

JAPAN

Lieutenant K. Higuchi, an Army pilot of the Tokorozawa Aviation Corps, while making a trial flight recently, fell from a height of twenty-five hundred metres, and was killed. The cause of the disaster was unknown. A committee consisting of five flight officers was designated to investigate the misfortune, and as far as they could determine, the aeroplane was very badly constructed, and it is probable that it gave way under a strain.

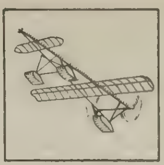
The *Aeronautic World*, of Tokyo, contains the information that Art Smith intends to visit Japan again this winter. He was advised by leading Japanese business men during his stay in Japan to come again and establish an aviation school and factory.

Engineering Lieutenant Nagao, of the Army Flying Corps, has been ordered to Europe to study aviation.



MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



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Wind Pressure on Aerocurve Surfaces

(*Continued from page* 391)

Suitable optical means were provided for observing them on an enlarged scale. In every case the tube mouth or membrane was quite flush with the aerocurve surface. This adjustment had to be made with considerable care, as the smallest error gave rise to marked discrepancies. No devices, such as a cheese cloth, etc., were employed to render the wind other than turbulent in this sense, but the velocity was kept fairly constant. The respective pressures on the underside of the aerocurve at the points A, B, C, O, D were compared relative to one another, all the various combinations, A with B, A with C, B with C, etc., being tested. The same was done with respect to the respective pressures on the top of the plane. Then the top, or, as it is usually termed, negative pressure at A, was compared with the positive pressure at a portion of the aerocurve, slightly on one side of A, but having the same position as A in so far as the leading and trailing edge are concerned. The same was done at B, C, O and D. Other combinations were also tried.

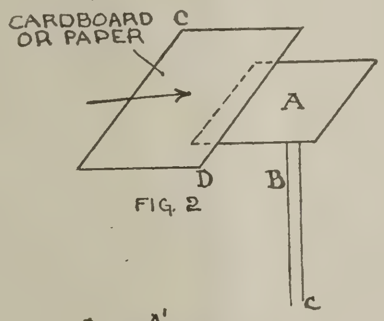


FIG. 2

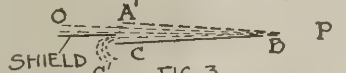


FIG. 3

The Fig. 1 A, B, C summarizes all these results.

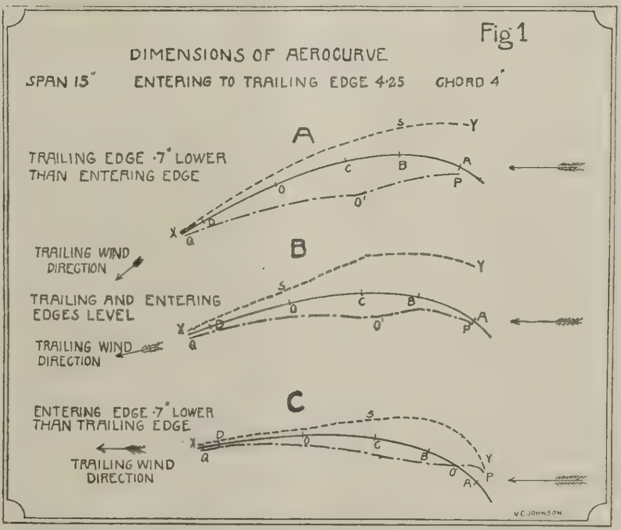
The positive pressure gave no trouble at all, the results agreeing fairly closely—nor did the negative in so far as the rear half of the aerocurve was concerned—but with respect to that portion contained between the entering edge and middle considerable difficulty was experienced. The camber of the aerocurve was purposely made somewhat excessive. The graphs show quite clearly the more efficient part of the aerocurve so far as the lift is concerned.

It will be noticed that even in the case of 1 C there still exists considerable lift, although the trailing wind is now horizontal.† The direction of the trailing wind was ascertained by means of smoke blown over the aerocurve, by lycopodium powder scattered on the same and then blown off, and by fine threads of unspun silk. In 1 B it will be noticed the trailing wind is slightly inclined upward compared with the tangent to the trailing edge. The following experiments were made with respect to what is known as the cyclic up-current. In Fig. 2, if A be the scale pan of a small and fairly sensitive balance with parallel motion so that B C must move vertically up and down, on placing a piece of light cardboard or paper on A, slightly larger than it and on balancing it carefully—and on blowing above or along the top of it (not on it) using a piece of cardboard C D as a screen (but not allowing it to touch A) so that all the "blow" shall pass along or above the cardboard it was found the scale pan at once rose, showing *apparently* diminished atmospheric pressure on the top of A. This is not, however, the correct explanation as can be shown as follows:

In Fig. 3, let A B be a sectional or side-view of the cardboard A. The air streams by the plane A B along the lines of O P, but when passing A the front edge of the plane, owing to viscosity ‡ (the kinematic viscosity of air is 14 times that of water) drags some of the air from *e* along with it (and from *c* as well, but we are not concerned with that) and we have what is known as a *cyclic up-current at A, tending to lift the first part of the plane.* If the plane A be a piece of paper, it will, if strongly blown across, finally lift up in front, be caught in the air current and blown away. Experiments with smoke fully confirmed this. If, instead of shielding the plane we have it inclined—if only at a very small angle to the horizon, this cyclic up-current is still formed even with the air blowing along both sides. Obviously the same holds with respect to an aerocurve, with a dipping front edge in order that it may meet the relative upward trend of the wind with minimum of shock. Fine threads of unspun silk attached to the underneath surface of the aerocurve shown in Fig. 1 A, B, C clearly proved its existence. In some experiments made with considerably less camber than the one illustrated, the negative pressure was proportionately less, but in every curve or plane experimented with it was always found to exist.

This does not mean that anything in the nature of a partial vacuum exists on the upper side of an aerocurve—as so many still appear to think—which *per se* assists the lift. The average pressure of the air is some 2,116 lbs. per square foot, and the maximum lifting effect of an aerocurve not *more than* 5 lbs. per square foot. § Divide 2,116 by 5, and we have 423. The greatest vacuity that could possibly be produced would be less than one-quarter of one per cent.

Fig 1


DIMENSIONS OF AEROCURVE
SPAN 15"
ENTERING TO TRAILING EDGE 4·25
CHORD 4"
A
TRAILING EDGE ·7" LOWER THAN ENTERING EDGE
S
Y
C
B
A
O
O'
P
X
D
Q
B
TRAILING WIND DIRECTION
TRAILING AND ENTERING EDGES LEVEL
TRAILING WIND DIRECTION
C
ENTERING EDGE ·7" LOWER THAN TRAILING EDGE
TRAILING WIND DIRECTION
V C JOHNSON

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† There is, of course, still a downward acceleration of the air with respect to the flight path.

‡ Viscosity may be defined as the adhesiveness of the fluid molecules to one another, so that resistance is thereby offered to deformation.

§ Since the above was first written there have, it is true, been cases where this is exceeded.

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested

The Odor Engine

Crime Committed by R. E. de Castro, Aided and Abetted by a Companion in Misery who Refuses to Divulge His Name—No Patents Pending—Right of Performing in All Languages Preserved, Including the Scandinavian.

WE present this week the drawing and description of the Odor-engine, which we believe is the greatest step backward in the history of aviation. For the past three years our staff of expert engineers, consisting of twelve plumbers, two surgeons and a dentist, has been working into the still small hours of the night to complete this monster of speed, strength—and imagination. The materials used throughout are of the finest texture to be found in the scrap heap, and thus it is easily seen that no expense has been spared in construction. All parts are accurately ground to within three-quarters of an inch. (Of course some of the parts do not quite fit, but they are parts which wear out first, so it doesn't matter.) Just to show what a stupendous achievement this motor is, when we showed it to that sterling citizen, Senator J. A. Oszk, he came out of his trance and with great emotion ejaculated the following: (*Censored.*) Others said things even worse, but it was just professional jealousy. Now for the dirty work!

The engine is a four-cylinder-horizontal-opposed-reciprocating-twin-six-vee-type-revolving-radial star. The cylinders, as may be seen from the drawing below, are graduated in size (each has a different *degree* of measurement), and the entire engine is rated in Mule-power, so that in an extreme emergency it can be used as a donkey engine. The mule-power of the cylinders varies with the size. That of the smallest is 9.9846534 centimeters, and the largest is 67.987876 kilograms. We have not yet figured out the total power of this gigantic engine, for we have no slide rule and the eight-hour law is very popular with us. The cylinders are of the best concrete obtainable (the slickest concrete-headed engineers are in our employ), and are lined with the finest cheese cloth. But why cheese cloth? Aha! Glance above at the title—Odor-engine!

The engine derives its power from the heart-rending action of the best limburger cheese of the Napoleonic era. This cheese is placed into a cast iron box—Figure B—and is strongly riveted to prevent its escape. Figure A is the propeller of special design, made of a very small size, so that the airflow will not disturb the action of the engine proper. The odor-laden air passes from retainer B upward through the special meter C, which registers indignation. From meter C it passes upward, more determined than ever into cylinders. The cylinders try desperately to get away, but as they are fixed upon circular hinges, all they can do is to revolve in furious protest. After doing its best to paralyze the cylinders the cheeseified air passes upward through exhaust F, continues on to pipe H, and then sneaks sullenly down into the retainer again, to once more start upon its journey. Anyone acquainted with the action of cheese will not doubt our statement when we say that the older our motor gets the stronger and more determined it becomes.

The flywheel X has a sort of dual personality. In the summer it has a fan attachment to keep flies off the pilot, and at all times is coated with a fine sandpaper so that the pilot may manicure his nails, polish his teeth and add luster to his eyebrows while in flight.

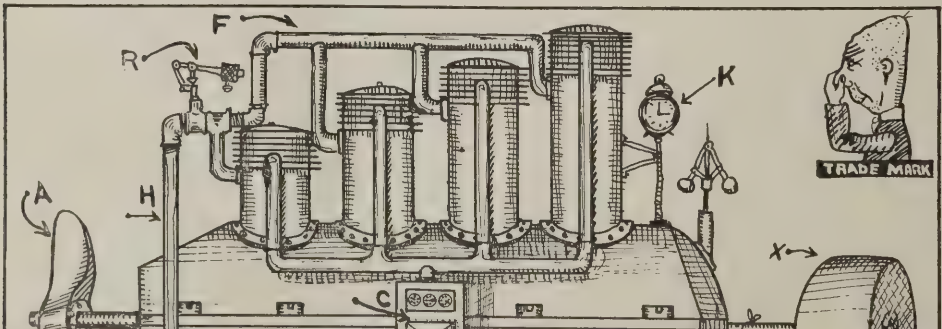
Careful notice is directed to the alarm clock K, perhaps the most noteworthy feature of the whole fraud—er—that is to say of the whole engine. There is a special attachment to the alarm clock (also an extra price), which blows a loud whistle at noon and at 5 o'clock (1 P. M. Saturdays). Thus the pilot of our machine will never have to worry about doing more work than he is paid for, for the whistle automatically reminds him that it is time to come down and put on the feed-bag.

It will be noted, perhaps, that we have said absolutely nothing about ball-bearings, crankshafts, pistons, spark-plugs or valves. We have decided that the time has come when all those absolutely worthless—but expensive things—should be done away with. We have freed ourselves, as it were, from the shackles of conventionality, and are arriving at the threshold of new and unthought of possibilities.

Special attention is drawn to door M, and faucet N, two absolutely new inventions. When anything seems to be going wrong, the pilot takes his key out of his pocket, opens door M, looks inside—and concludes that he knows absolutely nothing about the engine. (We come in for graft on repair charges.) The reason for the faucet is as follows: The pilot may carry a can of coffee (beer, if he prefers), open the door M and place the can inside. The contents are at once spilled all over the crank-case, mixed with oil and graphite, and there issues forth a new and marvelous beverage.

The valve R must be fearfully important, but up to the present time we have been unable to figure it out. Perhaps some of our readers may find a use for it. The governor, next to the alarm clock, also has some purpose, but the truth is we had an old one in the office and thought we had better use it before it decayed.

The price of the engine is sixty-eight rubles, F. O. B. Siberia. (We collect the kale on the freight charges.)



The Odor Engine

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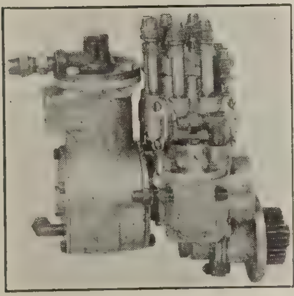

Supplied to the U. S. Navy

THE marked efficiency of the Christensen Self Starter is perhaps best suggested by the results of a test on a Hall-Scott Motor made at the Standard Aero Mfg. plant in Plainfield, N. J. There on a tank of air of 250 pounds pressure, 28 complete starts were made without recharging the tank, and the last start was made on the low pressure of 100 pounds.

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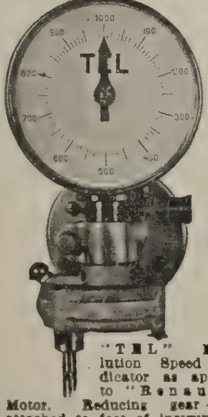

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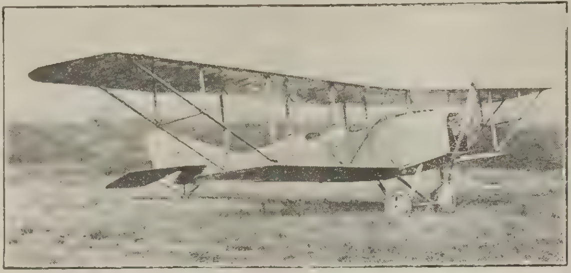
"TEL" Revolution Speed Indicator as applied to "Gnome" Motor. Separate reducing gear-box attached oil pump of motor.



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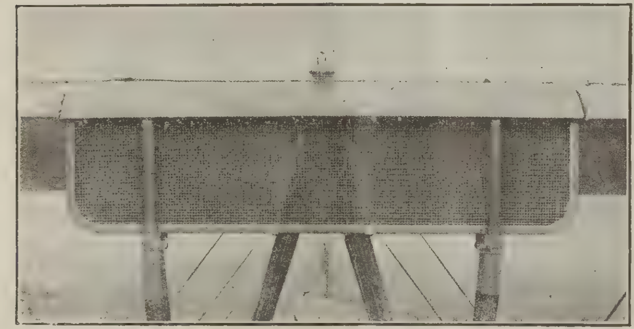

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AEROPLANE COMPANY
Jamaica Plain Boston

Construction and Operation of Kite Balloons

(*Continued from page* 413)

for various conditions. This can be varied by shifting the basket, either in the air or on the ground. At the proper angle of tilt, the balloon is steady, the angle of cable is near a maximum, and the tension in the cable near a minimum (about 600 lbs. at 30 mi. per hr.). Fifteen degrees is the usual standard when riding nearly full at normal altitude. The basket tackle needs very little attention after the proper setting has been once ascertained. The balloon will automatically adjust itself through a considerable range of wind and altitude. The tail cups must be set so there is sufficient play in the bridle to meet all conditions. Keep the tail cup adjusting rope just tight.

7. Some device for measuring the pull on the cable is very desirable. A properly calibrated scales, midway between the wind and the pulley, will answer the purpose if allowance is added for the weight of cable in the air. The tension *at the balloon* should not be allowed to exceed 3,000 lbs.

Automatic Pilot Installation in Twin Motored Hydroaeroplane

(*Continued from page* 409)

The main gyro unit, A, occupies a space 14½" by 14½" and stands, with its cover, 14" high. The azimuth gyro unit, *B*, controlling the directional stability of the machine, is 8¼" wide by 9" long and requires 8¼" for clearance. It is preferable that these two units be placed side by side in plain view of the pilot. The gyro units are electrically connected to the servomotor and to the generator by means of heavy waterproofed cable *G*, permanently fastened to the machine. Compact contact blocks, *H*, are inserted between each of the various instruments and the wiring system to facilitate the removal of any part of the installation.

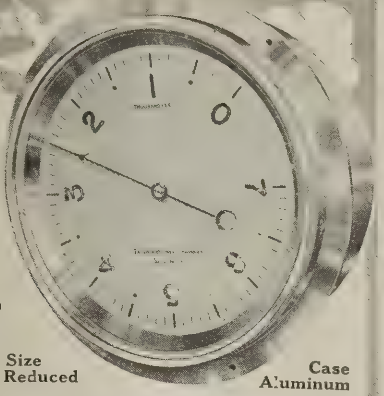
The servomotor unit, *C* and *D*, is composed of a double drum instrument, *D*, operating the flippers and the alierons at the direction of the main gyro unit, *A*, and a single drum motor, *C*, controlling the rudder as directed by the azimuth gyro unit, *B*. These motors occupy a total space 24" by 14" and require 8½" clearance. They are driven through a bevel gear, *F*, encased in a streamline case, by a wind turbine revolving at 3,000 R. P. M., this speed being reduced to 1,500 R. P. M., in the gear. A short length of link belt connects the two motors.

The Generator, *E*, is of 55 watt capacity, producing two amperes at twenty-two volts, when driven at 4,000 R. P. M. To avoid the possibility of damaging the gyroscopes by an accessive current as well as to provide current for running the instruments when the machine is on the ground a storage battery is placed in the circuit. This battery fits in at *I* and is of two ampere hours capacity.

A button switch, *J*, set into the knob of the stick control (when a "Dep" control is used the button is placed on the edge of the wheel), allows the main gyro to be thrown out electrically at any instant and the lateral and longitudinal stability of the machine controlled by the pilot manually. The mere placing of the feet on the rudder bar throws out the azimuth gyro in the same manner. This release of the controls from the direction of the gyro units is accomplished by opening the circuits which connect the servomotors to the gyro units. Throwing a small lever conveniently located by the pilot's hand disconnects the servomotors from the control drums mechanically by lifting out of mesh the clash gears interposed between the servomotor shafts and the drums.

A bank of four switches, *K*, and a volt-ammeter, *L*, are the only dash instruments necessary. These switch control the main gyro unit, the azimuth gyro unit the stallometer, and the servomotor clutches.

The weight of the entire installation, with waterproof covers (not shown), is under seventy pounds.



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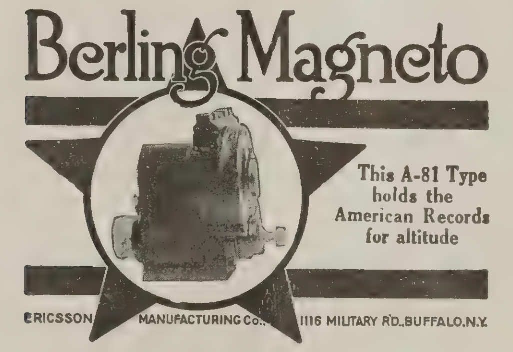

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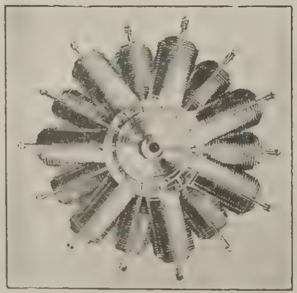

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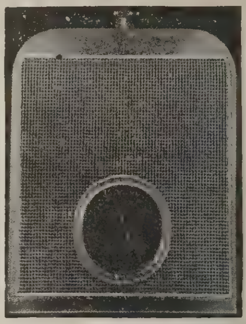

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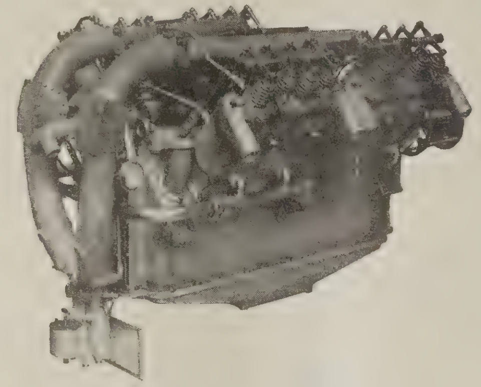

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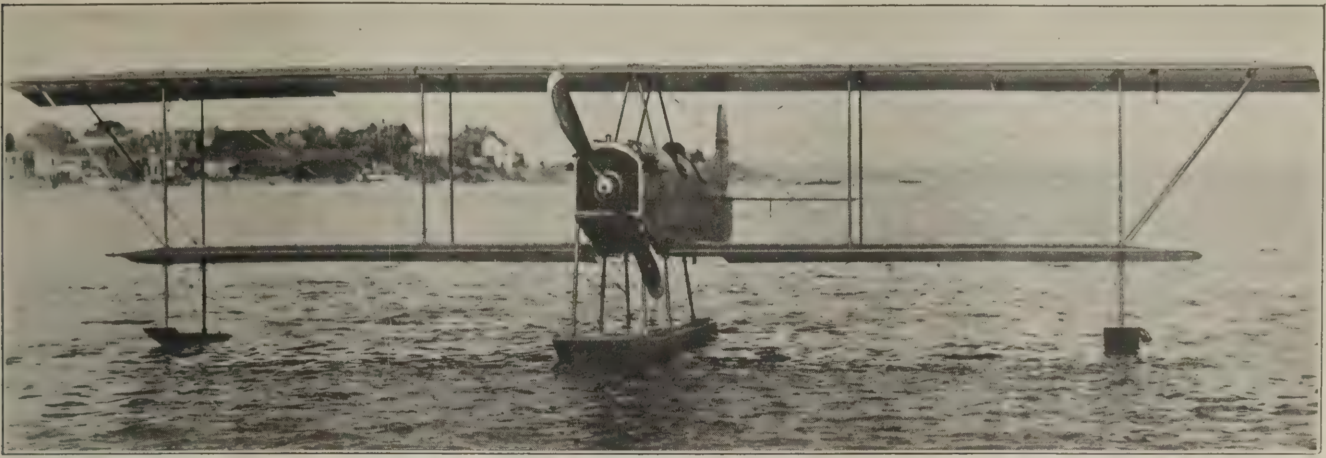

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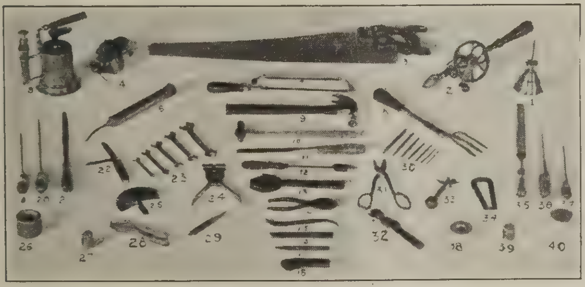

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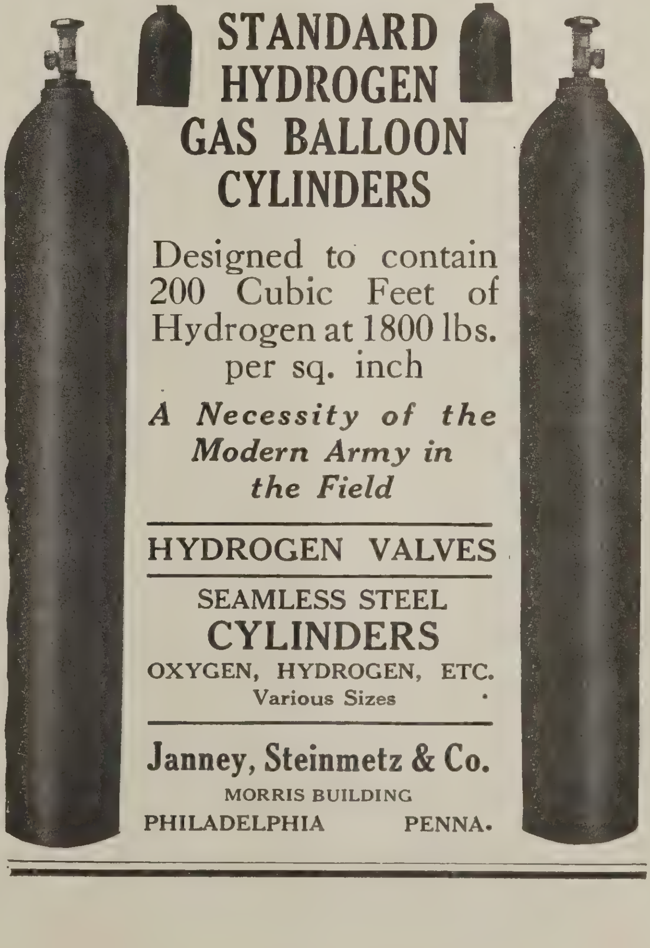

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Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
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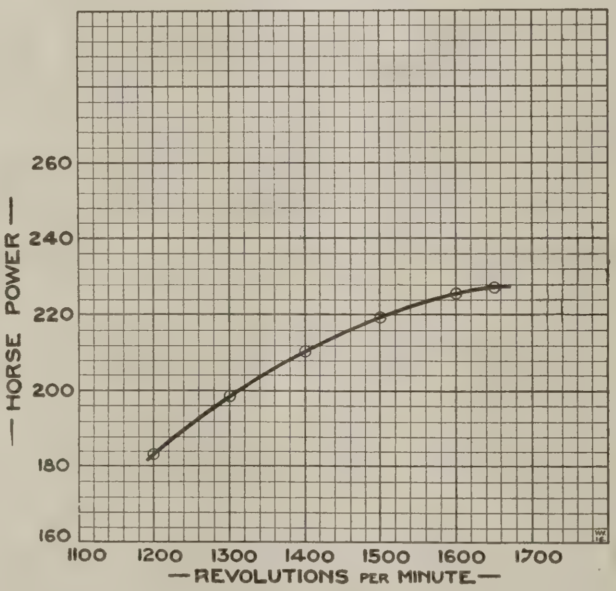

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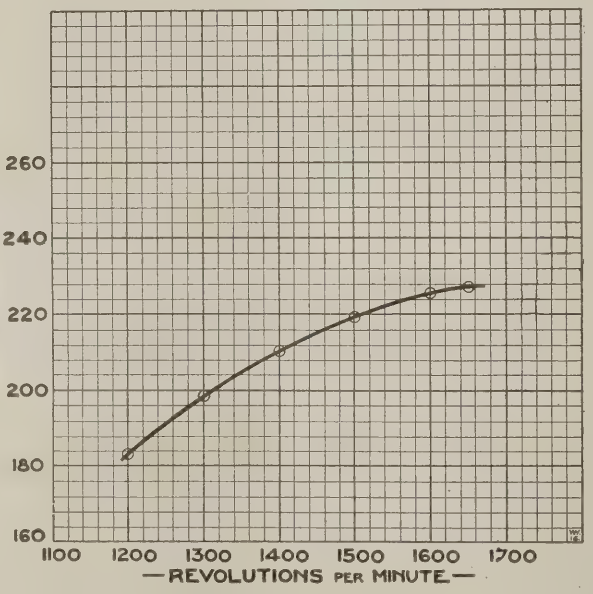
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50



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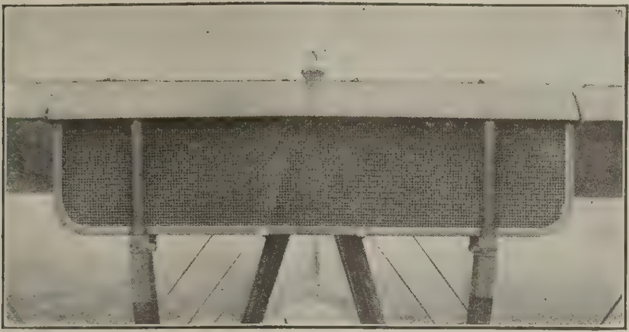

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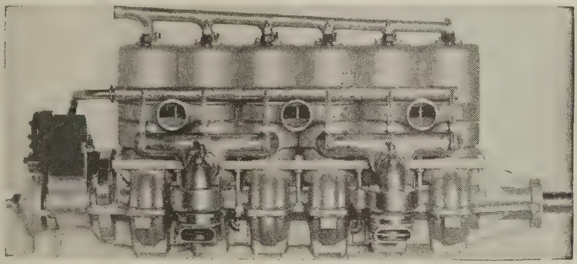

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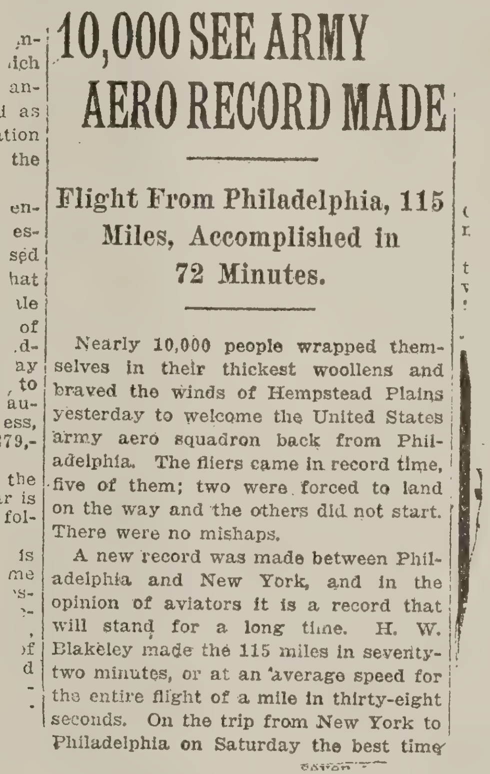

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Simplex Automobile Company
Wright Flying Field, Inc.
General Aeronautic Company of America, Inc. (*Export Company*)

Location of Plants

Western aeroplane factory
Los Angeles, Cal.
Eastern aeroplane factory
Site now being selected near New York
Experimental aeroplane factory
Dayton, O.
Aviation motor factory
New Brunswick, N. J. (Simplex Works)
Western flying field
Los Angeles, Cal.
Eastern flying field
Hempstead Plains, L. I.
Hydroaeroplane station
Port Washington, L. I.
Total men employed, 2362

Capital Stock

7% cumulative convertible preferred, $5,000,000 Common stock, of no par value, 500,000 shares

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C. S. Jennison, Vice-President
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TEN THOUSAND DELEGATES FROM NATIONS, CONGRESS, ARMY AND NAVY AND MILITIA, STATES, SCIENTIFIC, NATIONAL DEFENSE, EDUCATIONAL AND CIVIC ORGANIZATIONS TO ATTEND EXPOSITION

Conventions to Be Held Include Meeting to Bring Aeroplane Manufacturers Together to Solve Patent Problem

About 10,000 delegates representing every country in the world, the United States Senate and House of Representatives, the different branches of the Army, Navy, Militia, Coast Guard, Post Office, etc.; the 48 States, 500 cities, 1,000 scientific, national defense, educational and civic organizations interested in Pan-American matters and aeronautics are expected to attend the First Pan-American Aeronautic Exposition, which is to be held at the Grand Central Palace, February 8th to 15th.

Therefore, the Exposition is to be the most far reaching event which has been held anywhere or in connection with any line of human endeavor.

Aircraft Most Promising Factor in Solution of Two Gravest Questions of Today—The Upbuilding of Our Defenses and the Reconstruction That Will Follow This War

The Pan-American Aeronautic Exposition promises to be like the opening of the doors of a new age—the age of wings, which is coming fast, and promises to be a most wonderful age.

The aircraft is, as a matter of fact, the most promising factor in the solution of the two gravest questions of today, viz., the upbuilding of our defenses and the reconstruction that will follow this war. Likewise, the advent of practical aircraft, which are already capable of lifting 15 tons and flying at a speed of 125 miles an hour, and the increasing demand for military aircraft, which is bringing to the American aeronautic industry $50,000,000 worth of orders for the coming twelve months, are creating wonderful opportunities for engineers and business men of all contributing industries.

The Pan-American Aeronautic Exposition is to embrace everything aeronautical—all of which will be set in a most artistic staging, which expresses the idea of flight. There are over one hundred exhibitors, and every day is to have a special feature, with leading speakers and other attractions.

An Epochal Event

It is to be an epochal event and thousands of people are expected to attend the opening of the doors of this new Age of Wings and see the last word in aircraft for war and peace, and their powerful motors, armament and scientific instruments for aerial navigation. Also the new aeronautical maps, plans for aerial mail-carrying, for aerial coast defense —and hundreds of other things of interest which represent the work of the aeronautical industry, and the contributing industries and our aerial resources for national defense.

A Meeting of Aeroplane Manufacturers to Discuss Advisability of Combining to Avoid Patent Litigation

A substantial preliminary program of daily meetings and discussions has been outlined as follows:

Opening of the Show at 8 P. M. President and Mrs. Wilson have been invited and may attend. Also Governor Whitman and Mrs. Whitman; Mayor and Mrs. Mitchel; Ambassador and Mrs. Da Gama and the other Pan-American authorities including John Barrett, Director-General Pan-American Union, Alberto Santos-Dumont.

Mayor Mitchel of New York presiding.

Address by Ambassador Domicio Da Gama, of Brazil, Dean of Pan-American Diplomats.

Address by Hon. John Barrett, Director-General Pan-American Union on "Aerial Transportation to be an Important Factor in Developing Pan-Americanism."

Address by Alberto Santos-Dumont, Honorary President of the Pan-American Aeronautic Federation, on "Difficult Problems of Transportation in South and Central America to be Solved by Aerial Transportation."

Address by Emerson McMillin, Juridicial Delegate Pan-American Aeronautic Federation.

Address by Mr. Henry White, President of the Pan-American Society of the United States.

FRIDAY, FEBRUARY 9th

Aeronautic Engineers and Standardizing Day

(Held under the Auspices S.A.E.)

Afternoon Session, 3:00 *P. M.*

Henry Souther,Technical Advisor, Aviation Section, Signal Corps, U. S. Army, will tell what parts the Aviation Section of the Army believes could be standardizezd in the immediate future, illustrating points on the screen.

A naval officer will tell what parts the Aeronautic Section of the Navy he believes could be standardized in the immediate future. General discussion will follow in which manufacturers and engineers will participate.

Evening Session, 8:30 *P. M.*

Charles M. Manly, Technical Advisor U. S. Army, presiding.

Paper by Lieut. John H. Towers on "Naval Seaplanes."

Paper by W. Starling Burgess on "Hydroaeroplane Construction."

Paper by Elmer A. Sperry on "Instruments for Aerial Navigation."

Paper by Professor F. W. Pawlowski, University of Michigan.

Paper by Lieut. Jerome C. Hunsaker, U. S. N., on "Theory and Construction of Dirigibles."

Paper by Captain Virginius E. Clark, U. S. A., on "Military Aeroplanes."

Papers on "Aeroplane construction," by Charles H. Day, Grover C. Loening, Chance M. Vought and J. A. D. McCurdy, Charles F. Willard, Walter H. Phipps.

Paper by F. G. Diffen on "Standardization of Fittings."

Papers and discussion of aeronautic motors by Lieut. W. G. Child and W. A. Edwards, U. S. Navy; Henry Souther, Charles M. Manly, H. M. Crane, Charles B. Kirkham, W. R. McCulla, Frank H. Trego, G. H. Abel, B. C. Scott, and other engine experts.

SATURDAY, FEBRUARY 10th

Aeronautic Science and Collegiate Day

First Session, 3:00 *P. M.*

W. D. Walcott, Secretary Smithsonian Institution and Chairman, Executive Committee, National Advisory Committee on Aeronautics, presiding.

Addresses by Professor Pupin of Columbia University, member National Advisory Committee on Aeronautics; Dr. S. W. Stratton, Director of the Bureau of Standards.

Paper by Orville Wright, Thomas A. Edison, Dr. A. Francis, Glenn H. Curtiss, W. Starling Burgess, and Glenn L. Martin.

Evening Session, 8:30 P. M.

Rear Admiral Robert E. Peary, Chairman National Aerial Coast Patrol Commission, presiding.

Address by Dr. Richard C. McLaurin, President Massachusetts Institute of Technology, pioneer in establishing a course of aerodynamics in an educational institution.

Paper by E. R. Maurer, Professor of Mechanics, University of Wisconsin. Prof. E. N. Fales, Instructor in Aeronautics, University of Illinois; Professor B. Newkirk, of the University of Minnesota; Professor Herbert Charles Sadler, University of Michigan; Professor David Todd, Amherst University; Prof. Charles E. Lucke, Columbia University; Prof. W. T. Macgruder, Ohio State University; Prof. S. P. Breckenridge, Yale University, and others on "Introducing Aeronautics in Universities."

Major Carl F. Hartmann, U. S. A., on "What Universities Can Do to Develop Aviation Reserve Officers."

MONDAY, FEBRUARY 12th (Lincoln's Birthday)

Congress and Aerial Defense Day

(President Abraham Lincoln was the first to recognize the value of aircraft in warfare, and he commissioned Professor Lowe to provide balloons for the Army, which operated with success before Richmond in the Civil War.)

Afternoon Session, 3:00 P. M.

Alan R. Hawley, President of the Aero Club of America, presiding. Speakers: Senator George E. Chamberlain, Chairman Senate Committee on Military Affairs; Senator Benjamin R. Tillmar, Chairman Senate Committee on Naval Affairs; Congressman S. Herbert Dent, Jr., Chairman House Committee on Military Affairs; Congressman Lemuel P. Padgett, Chairman House Committee on Naval Affairs; Hon. Newton D. Baker, Secretary of War; Hon. Josephus Daniels, Secretary of the Navy; Major-General Leonard Wood.

Evening Session, 8:00 P. M.

Henry A. Wise Wood, Chairman Conference Committee on National Preparedness, presiding.

Speaker: Hon. William M. Ingraham, Assistant Secretary of War, member of the National Aerial Coast Patrol Commission; Franklin D. Roosevelt, Assistant Secretary of the Navy; Brigadier-General George P. Scriven, Chief Signal Officer, U. S. Army; Lieut. Col. George O. Squier, officer in charge, Aviation Section; Signal Corps, U. S. Army; Rear Admiral W. S. Benson, in charge of Departments of Operations, which has the jurisdiction over naval aeronautics. Congressman Murray Hulbert, Rear Admiral Robert E. Peary, Lieut. V. D. Herbster on the "Value of Dirigibles for Naval Warfare;" Captain Charles D. F. Chandler, in chage U. S. Army Balloon Aviation School on "Kite Ballons for Military Purposes;" Lieut. Comm. Henry C. Mustyn, U. S. Navy, on "Naval Aeronautics."

TUESDAY, FEBRUARY 13th

Aerial Transportation Day

Afternoon Session, 3:00 P. M.

Rear Admiral Robert E. Peary, Chairman, National Aerial Coast Patrol Commission, presiding. Speakers: Postmaster General Burleson on "Mail Carrying by Aeroplanes."

Hon. Byron R. Newton, Assistant Secretary of the Treasury, head of the Coast Guard, on "Employing Aeroplanes for Saving Life and Property at Sea."

Henry Woodhouse, "Developing Large Aeroplanes for Commercial Transportation, and What Aircraft May Do in the Reconstruction That Will Follow the War."

Patrick Y. Alexander, "Aeronautic Developments Abroad."

Evening Session, 8:00 P. M.

Henry A. Wise Wood, President, American Society of Aeronautic Engineers, Vice-President Aero Club of America, presiding. Speakers: Alexander Graham Bell, inventor of the telephone and pioneer in aeronautic experimentation; Henry B. Joy, Chairman Lincoln Highway Association, on "Establishing the Lincoln Airway." Alan R. Hawley, President of the Aero Club of American on "The Plans for the Trans-Continental Aeroplane Contest 1917." E. R. Preston or Ralph H. Upson, Goodyear Tire & Rubber Company; Raymond B. Price, U. S. Rubber Company; Mr. C. F. Smyth, Connecticut Aircraft Corporation on "Developing Dirigibles for Commercial Purposes."

(Continued on page 444)

CAPTAIN AMUNSDEN AND CAPTAIN BARTLETT TO USE AEROPLANES IN POLAR EXPLORATION

FOLLOWING a series of meetings and conferences in which participated Rear Admiral Robert E. Peary, discoverer of the North Pole; Captain Roald Amundsen, discoverer of the South Pole; Captain Robert A. Bartlett, Peary's navigator when he discovered the North Pole, and the Aero Club of America officials, Admiral Peary announced on December 22d that both Captain Amundsen and Captain Bartlett would in the near future command independent expeditions into the North Polar Ocean, with the purpose of drifting across that Ocean, and making a thorough scientific study of the physical conditions of the Central Polar Region.

Both explorers will have new ships built expressly for their work, Amundsen's in Norway, Bartlett's on the Pacific Coast. Both expeditions have the indorsement and encouragement of the National Geographic Society. Both will use aeroplanes and have the active co-operation of the Aero Club of America in forming their equipment of aeroplanes and aviators.

Bartlett's American expedition will enter the polar ocean by way of Bering Strait. Amundsen will enter by the route north of Norway and the Kara Sea.

Arrangements will be made for co-ordination of the scientific observations of the two expeditions. With the aid of their aviation equipment they may be able to complete the geographical reconnoissance of the entire North Polar Ocean, and it is possible that in the event of the crushing of either one of the ships by ice the aeroplanes may be instrumental in enabling one crew to reach the other ship by establishing direct communication and carrying supplies.

If the work of the aeroplanes is satisfactory it would make possible the circumnavigation of the globe via the two poles by ship and aeroplane, as was predicted by Admiral Peary at the Explorers' Club a few years ago.

Both will be prepared to stay on ice from three to five years to make a scientific study of physical conditions in the central polar regions. Starting from different points, the expeditions intend to drift across the North Polar Ocean and possibly may meet or pass perhaps at the pole itself.

The possibilities of employing the aeroplanes more extensively than now planned by the explorers are to be considered by a special committee of the Aero Club of America. It is thought possible to employ the aeroplanes first in preliminary photographic work of the Arctic regions through which the explorers are to drift, then to keep in touch with the expeditions from the base while they are drifting, and in other ways.

Both expeditions are to start in the summer of 1918, by which time aeroplanes will be even better than they are today, and continuous flights of up to 1,000 miles will be feasible. So that the aeroplanes may become of great value to the exploring expeditions, linking them together as well as with the outside world.

Captain Amundsen has been presented with an aeroplane by Mr. Harry Bowers Mingle, president of the Standard Aero Corporation.

Mr. Mingle was present at a luncheon given to Captain Amundsen at the Aero Club of America. Among those present were: Alan R. Hawley, president; Charles Jerome Edwards, Henry Woodhouse and Henry A. Wise Wood, Evert Jamsen Wendell, members of the Board of Governors; William Hawley, Robert Erskin Ely, Augustus Post, G. Douglas Wardrop, Ezra H. Fitch, Walter H. Phipps, Harold D. Kantner, George H. Guy, T. D. Merrill, F. Erickson, Spencer Heath, J. G. Gilpatric and Henry W. Shoemaker.

The Standard Aero Corporation will build the machine along lines to be passed upon by Captain Amundsen or his engineer, or expert associates. The power plant is to be determined later, when the type best adapted for Arctic work has been determined.

THE NEWS OF THE WEEK

Hempstead - Philadelphia and Return Flight

Another fine flight has been made by the Mineola aviators, who a month ago flew to Princeton for the game.

The start was made about five minutes of ten Saturday morning, December 30th. All machines were lined up in two rows and after movies and camera men had taken pictures, and after the motors had been thoroughly warmed, start was made by Captain R. C. Bolling, First Aero Company, New York National Guard, followed by Captain Joseph E. Carberry, U. S. Army, and the rest at intervals of about thirty or forty seconds. Each machine made two circles of the field, and started for Philadelphia at a height of about 1,500 feet.

The day was almost ideal except for a slight head wind, and most of the machines followed the course via Sheepshead Bay to Oakwood Heights, Staten Island, thence to Perth Amboy to Trenton, following the Delaware River to League Island, the Philadelphia Navy Yard. Captain Rader with a score of mechanics had marked out the field and made the landing very easy. Machines arrived in the following order: Corporal H. H. Salmon, Jr., with Lieut. A. J. Coyle as passenger; P. C. Millman with S. A. Blair as passenger; H. W. Blakely with T. M. Reynolds as passenger. (Just as the above was making a landing a glass blew out of his goggle and he hit a flag pole, pancaked to the ground and nosed over after striking the ditch. However, his plane was uninjured except for a broken wheel.) Captain J. E. Carberry alone, Lieut J. E. Miller alone, followed closely by Lieut. B. Osborne, alone; Pilot Instructor A. L. Allen, with W. Leonard Bonney as passenger. Later, about two o'clock, Lieut. E. W. Bagnell, with Serg. E. A. Kruss as passenger.

Lieut. W. G. Kilner with J. B. Stetson, Jr., of Philadelphia, started, but blew out a water connection and were forced to discontinue their flight almost before they had gotten away from Hempstead. Lieut. Norbert Carolin, with Lieut. Wheaton as passenger, had motor trouble and were forced to land at Deans, New Jersey, in a very poor landing field, smashing the plane so that they could not continue. Sergeant D. R. Noyes, with Cadet Meredith, of West Point, as passenger, were forced to land at Monmouth Junction, New Jersey, having burned out the radiator.

Captain Bolling, who was flying alone, had motor trouble and came back to the field, and after some minor repairs started for Philadelphia about noon, but was forced to descend in a bean field in Milltown, New Jersey, and was unable to continue.

The best time to Philadelphia on the down journey was made by Corporal Salmon, who covered the distance in 97 minutes. The rest of the machines took anywhere from that up to two hours. A good size crowd had gathered at League Island and in the streets of Philadelphia and cheered as the aviators arrived.

The aviators had lunch at the Island, and were quartered on the battleships "Minnesota," "Wisconsin," "North Dakota," "South Dakota," of the Atlantic Reserve Fleet, and the Navy extended all the courtesies to the Army.

The return trip was made Sunday morning, Lieut. J. E. Miller, alone, starting the procession at 11:18, followed by Corporal Salmon, alone; Lieut. A. J. Coyle, alone; Sergeant E. A. Kruss, alone; Captain J. E. Carberry, alone; H. W. Blakely, with T. M. Reynolds as passenger, and W. Leonard Bonney, alone. P. C. Millman was unable to start owing to motor trouble. Lieut. A. J. Coyle while flying between Keyport and Staten Island developed motor trouble and was forced to land in the water along the shore of Princess Bay, Staten Island. Sergeant E. A. Kruss was forced to land at Redbank, New Jersey. Both of these aviators expect to continue if necessary repairs can be made to their machines. Lieut. Coyle's accident was a rather dramatic one, as he was picked up by a motor boat and the machine towed to shore.

The first to arrive at Hempstead was Corporal Salmon, who covered the distance in 90 minutes, followed closely by Lieut. J. E. Miller, who required 96 minutes. Captain J. E. Carberry, on his arrival delighted the crowd by a series of sharp spirals and loops before descending. Shortly afterward, H. W. Blakely, in his 140 H.P. L. W. F. came to earth, making the remarkable time of 72 minutes. Later in the afternoon W. Leonard Bonney arrived in another L. W. F. in 78 minutes, the other 3 officers flying 90 H.P. Curtiss machines (J. N. 4's). The men suffered very much from the cold, Captain Carberry suffering through having his nose frozen, while all the men complained especially of cold hands.

While at League Island they were shown the German raiders, the Crown Prince Wilhelm, and the Eitel Frederick, and were especially interested in the "little German village" which the sailors had built at one end of the island.

The getaway from Philadelphia was made under very unfavorable conditions, inasmuch as the aviators were forced to take off with the wind and over the Delaware River. However, launches were in readiness to pick up any of the aviators whos motors might have quit shortly after take off.

It was another splendid flight, and all who participated deserve hearty congratulations. Considering that a year ago there were not any army aviators or army aeroplanes in the East, we may feel gratified over the progress made—and hope that it will develop to fifty times that size by January 1st, 1918!

A. L. Allan Takes Reserve and Expert Certificates

Upon authority from Officer in Charge, Aviation Section, Signal Corps, Washington, D. C., dated November 14, 1916, and verbal orders Officer in Charge, U. S. Aviation Station, Chicago, Illinois, dated November 20, 1916, Mr. A. Livingston Allan completed Reserve Military Aviator's tests on November 21, 1916, under the supervision of Captain H. R. Christie, Signal Corps.

He took the following tests and completed them most satisfactory, showing at all times excellent judgment and skillful handling of aeroplane:

(a) Climbed out of a field 2,000 feet by 2,000 feet, attaining an altitude of 500 feet, keeping all parts of machine within field. Handling of machine excellent.

(b) Forty-five-minute flight at an altitude (minimum) of 4,500 feet. Excellent.

(c) Cross-country flight of thirty miles and return. From U. S. Aviation Station, Chicago, Illinois, to Joliet, Illinois, landing there and return. Minimum altitude 2,500 feet. Excellent.

(d) Cross-country triangular flight of thirty miles. From U. S. Aviation Station, Chicago, Illinois, to Jackson Park; thence to Calumet Lake and return to U. S. Aviation Station. Excellent.

(e) Attained an altitude of 1,500 feet, cut motor (dead), spiralled to right and left and landed within fifty feet of a previously designated mark. Excellent.

(f) Attained an altitude of 1,500 feet, cut motor (dead), and glided into an assumed field 100 feet wide by 1,000 feet long, clearing assumed obstacle 10 feet high at one end and coming to stop within field. Excellent.

Theoretical Tests—Navigation of air, 95%; aerodynamics, 90%; radio-telegraphy, 90%; motors, 95%; meteorology, 95%; map reading, 95%.

So he was granted both the Reserve Military Aviator and the Aero Club Expert certificate.

Favors Aeronautics Course in Ohio State University

Prof. William T. Magruder, O. S. U. engineering department, favors a course in aeronautics. While in New York he discussed the subject with members of the Aero Club of America.

The club's officials stated that if 100 university students will study aeronautics an aeroplane station under the direction of U. S. army officers may be stationed on the campus.

The initial cost of a curriculum such as Magruder proposes would be $35,000 and a minimum appropriation for new apparatus and machines would not exceed $5000.

Pacific Aero Club to Preserve the Column of Progress as Monument to Fliers

The Column of Progress on the Marina, which during the exposition was designated as a monument to aviators, is to be preserved in that rôle. A committee was appointed at the meeting of the Pacific Aero Club in the Palace Hotel to start a campaign to raise funds for the permanent preservation of the monument.

The plan is to place the monument upon a firm base and concrete its entire height. It will cost in the neighborhood of $25,000, according to J. C. Irvine, president of the Pacific Aero Club. Of this amount the preservation league has in trust $7,500 raised by previous subscription.

Bronze plaques bearing the names of fliers who have advanced the science of aeronautics also will be placed on the column, as will the names of the fliers of California. The names decided upon were those of the Wright brothers, Professor Langley and Lincoln Beachy, who met his death within a few hundred feet of the column. Plaques bearing the names of the Aero Club of America and the Pacific Aero Club also were decided upon.

The club also passed a resolution to the special committee which is shortly to come from Washington to select sites in California for aero bases, recommending the Redwood City site.

Lieutenant D. B. Sanger gave a talk on the uses of the aeroplane in the army. He urged the establishment of a reserve and schools where the science can be properly taught. Other speakers were George A. Merrill, Mayor of Redwood; Frank Bryant, Roy Francis and a number of Redwood City business men.

Aero Club of Hawaii Elects President

Brigadier General F. S. Strong, U. S. A., has been elected as President of the Aero Club of Hawaii, Honolulu, H. I.., to fill the vacancy caused by the resignation of Brigadier General Robert K. Evans. The fact that the membership of this Club now numbers three hundred and thirty-three, having doubled in the past six weeks, indicate the awakened and awakening interest in aviation in Hawaii.

Personal Pars

William T. Cook and J. R. Hutchinson, of Davenport, Iowa, are to open a winter school at New Orleans, it is stated.

Roger Amory of the class of Harvard, 1910, chairman of last year's Undergraduate Aero Training Corps, addressed the men who intend to enter the Government schools of aviation in the summer.

Charles H. Day, the Chief Engineer of the Standard Aero Corporation, was the speaker at the last meeting of the Standard Aero Club.

Al Johnson, who spent nine months in Europe representing the Curtiss Co., is now an instructor at the U. S. Army Aviation Field, Chicago. On December 18, he was married to Miss Loraine Carrier of Buffalo, N. Y.

Instructors at the Army Aviation Field at Chicago. Left to right: Victor Vernon, J. D. Hill, A. L. Allan, T. C. Macaulay, and Al Johnson

Glenn H. Curtiss, Jr., who apparently has inherited the artistic proclivities of his father.

Army and Navy Orders

Aviation Section, Aeronautic Station, Pensacola, Fla., Capt. Francis T. Evans.

M. Bks., Aeronautic Station, Pensacola, Fla., Capt. Edward B. Cole.

M. Bks., N. Yd., Philadelphia, 2d, 4th, 5th, 6th, 15th and 19 Cos., Col. Charles G. Long.

Naval Constructor G. C. Westervelt, detached aid on staff of commander submarine force Atlantic fleet; to Buffalo, as superintendent construction of aircraft works, Curtiss Aeroplane Company.

Aeroplanes in Mexican Manoeuvers

According to the Tulsa (Okla.) *World*, striking demonstrations of the value of aeroplanes in the last field maneuvers brought forth the declaration by Major General J. J. Pershing, commander of the expeditionary forces, that he would rather have an aeroplane than a regiment of cavalry for reconnaisance work.

The problem which the troops at field headquarters sought to solve and in which aeroplanes and trucks were used for the first time involved an attempt to ford the Casas Grandes River at one of three points. These fords, three miles apart, were defended by a regiment of infantry at war strength, a battery of field artillery and a squadron of cavalry. The defenders also had the use of a truck train of 27 cars. Each side had one aeroplane.

Flying about 2,500 feet above the earth, a distance considered ample since the forces had no anti-aircraft guns, Capt. Davenport Johnson, for the defenders, was able to follow the movements of the cavalry from the moment they left their base 12 miles from the river, to the point where a squadron was detached to make a feint at the south ford while the main body dashed toward the north passage. His work enabled the commanding general to mass his infantry at the ford threatened by using the motor trucks.

The aero scout for the attackers, Capt. Maxwell Kirby, had a more difficult task. His objectives were screened by the trees along the river. Movements of troops also were more or less confused with those of organizations in headquarter's camp, which backed the fords. In spite of this he was able to locate the artillery where it had been concealed under the trees and to fix definitely the points where the main bodies of infantry were posted.

Both aviators were in the air four hours with only a few landings to rest them. Messages were sent by means of parachutes and smoke bombs. The task of piloting an aeroplane in puffy air, observing and writing messages taxed the pilots to the utmost. At one time there was considerable excitement for it was thought the airmen were staging a fight above the clouds. The impression was the result of the closeness of the machines and the fact that both were firing smoke bombs.

Dinner Tendered Lieut. Commander H. C. Richardson

Lieut. Commander H. C. Richardson, U. S. N., was the guest of honor at a dinner recently tendered him by Robert L. Lehnert, of Virginia, on the occasion of his leaving his assignment at the Washington Navy Yard to engage in other important aeronautical work at the Naval Flying School at Pensacola, Fla. Commander Richardson has been stationed in Washington for four years.

Present at the dinner, in addition to the host and the guest of honor, were F. J. Richardson, J. E. Lehman, P. W. Lee, W. A. Ball, E. R. Sartwell, Frank Healy, Willis Davis, Lieut. J. C. Munford, U. S. N.; George E. Poe, R. L. Smith, Stuart Godwin and H. C. Peet.

Goes to Holland for Internment

Lieutenant J. Errol Boyd, a Canadian aviator, has returned to Holland to offer himself anew for internment, his leave of absence on parole having expired.

The aeroplane which the lieutenant was flying had become disabled during a fight last August with a Prussian aviator, and the Canadian (he is twenty-four) was compelled to volplane toward the Holland border. He descended within Dutch territory and was forthwith interned. His nerves had suffered a great deal and the Dutch authorities, with the consent of the Prussians, consented to the young man's return to Canada on a two months' leave of absence. This was afterward extended to six months.

Harvard Men Eager to Fly

A score of Harvard students will enlist in the undergraduate aero training corps at Cambridge directly after the new year. The Harvard training course will be divided into two classes, for the preliminary and advanced students, which together extend over a period of six months and entitle those who take the course to a commission as a regular officer in the reserve corps. It is necessary to enlist for four years in order to enroll for the preliminary training.

After passing the preliminary test, the students will be sent to one of the three schools where advanced instruction is given.

Carlstrom Once Cowpuncher

A Sanduskian, Uri B. Curtis, taught Victor Carlstrom how to operate an aeroplane. From the window of his office at an East Side motor works he watched Carlstrom on the way to New York from Chicago as he flew over Sandusky and until he disappeared in the direction of Cleveland. He says he was thinking all the time of the rough young cowpuncher from Arizona who accosted him at Los Angeles, Cal., where he was in charge of an aviation school two summers ago.

"He was a cowboy, all right, but he wanted to be an aviator," said Curtis. "Instead of skipping over the ground as we told him he would have to do for a week or ten days, he pointed the nose of his machine upward and soared above the clouds as soon as he knew how to operate an engine. A more daring fellow I never knew."

Ten days after he walked upon the Los Angeles aviation field Carlstrom was a licensed aviator, Curtis says.

S. A. E. Mid-Winter Meetings

On Tuesday, January 9th, and Wednesday, January 10th, meetings of various divisions of the Standards Committee will be held. Thursday morning, January 11th, at 10 o'clock, the formal business of the Society will be transacted, and at this time the results of the election of officers for the ensuing year will be announced. Reports from the Standards Committee on several matters will also be presented. Following a buffet luncheon served in the same building at 12:30 will be the first paper of the Professional Session. The timetable is as follows:

1:30—Some Problems in Aeroplane Construction—Capt. Virginius E. Clark, U. S. A. (Capt. Clark is expected to cover some of the Army experiences in operating aeroplanes on the Mexican border. He will use these experiences as a basis for suggesting changes in design necessary for securing a successful military airplane.)

2:30—The Ultimate Type of Tractor Engine—H. L. Horning. (Mr. Horning has made a thorough study of the application of engines to tractors. His suggestions relating to the ultimate tractor engine will treat of methods of obtaining higher efficiencies and of making use of kerosene and other low-grade fuels. He will probably go into details regarding material for such engines.)

3:30—Dynamic Balance of Rotating Parts and Dynamic Balancing Machines—F. Hymans. (Mr. Hyman's paper first shows the considerations necessary in securing dynamic balance and then explains types of machines for doing such work.)

Other papers to be discussed if time permits between the presentation of the above scheduled papers are as follows:

Dynamics of the Automobile—N. W. Akimoff. The main part of Mr. Akimoff's paper is devoted to an analysis of a one-wheel elementary car. This analysis is used to deduce the requirements in design necessary for a rational automobile suspension.

Some Essential Features of High-Speed Engines—A. F. Milbrath. (Mr. Milbrath's paper gives considerable data that are the result of several years' experimental work in manufacturing high-speed engines. The various parts of the engine are taken up and the best construction and dimensions are indicated.)

Heat Balance Tests of Automobile Engines—Walter T. Fishleigh and Walter E. Lay. (This paper gives the result of some valuable research work conducted by the authors at the University of Michigan. Data are included relating to the distribution of the heat of the fuel in power, friction, jacket-water and exhaust losses.)

Aerial Navigation Over Water—Elmer A. Sperry. (Ordinary flight over land is usually made with landmarks. A flight over sea devoid of landmarks must employ other means. Mr. Sperry's paper discusses fully such means and their use, including the troublesome matter of drift and absolute headway.)

The annual banquet of the Society will be held at the Hotel Biltmore at 7:30. This will be preceded by a reception to all members and guests at 6:30.

The Society will close its "busiest day" by an attendance, en masse, at Ziegfeld's Midnight Frolic on top of the New Amsterdam Theatre. The entire seating capacity for this performance has been purchased by the Society and its guests.

Howard Huntington Resigns from American Aircraft Company

Howard Huntington, who has been Vice-President and Construction Engineer of the American Aircraft Company, has resigned and has severed all his connections with the company. When interviewed, Mr. Huntington said: "I found myself, at the end of several months, in entire disagreement with the policy of the controlling interests, and consequently decided to sever all connections with the company as an officer and as an engineer."

Army Aviation School at Memphis

According to press dispatches, the entire army equipment at the Ashburn Field will be moved to Menphis, Tenn., for the winter. This action has been made necessary on account of the unfavorable condition of the Ashburn Field.

Aerial Russia

Considering the importance of aerodynamical development in Russia, the author of the book, "Aerial Russia," from the press of John Lane Company, New York, has undertaken a somewhat ambitious task in a volume of 150 pages. But much valuable information regarding aeroplanes and aviation is given by this Russian officer. He enters into full particulars regarding the progress of the science of aviation in Russia, and of the production of the giant aeroplanes designed by Sikorsky.

Russia's aviators and aerial scientists possess an inexhaustible supply of ideas, while Great Britain's industrial and financial resources are unequalled. The book is packed full of interesting information, and is well worth the price—$1.00.

Proposed Technical Session to be Held During the First Pan-American Aeronautic Exposition

At a meeting of the Council of the Society of Automobile Engineers held in Detroit on December 14th, 1916, it was voted that the Society through its Meetings Committee should cooperate with the Aero Club of America, The National Automobile Chamber of Commerce, The Motor and Accessory Manufacturers and the National Advisory Committee for Aeronautics, in arranging for and conducting a technical session at the time of the First Pan-American Aeronautic Exposition.

At a meeting of the S.A.E. Meetings Committee held at the Automobile Club of America on December 19th, 1916, it was agreed that the arrangements for the proposed technical session should be handled by the Metropolitan Section in lieu of its regular February meeting. This arrangement was later agreed to by Mr. Russell Huff, President of the S.A.E. and Mr. Leonard Kebler, Chairman of the Metropolitan Section S.A.E. At this meeting Mr. John Cautley suggested that the subject of stabilizers be considered at the proposed technical session.

At a meeting of the Metropolitan Section held at the Automobile Club of America on December 21st, it was announced that the next meeting of the Section would be held in connection with the proposed technical session at the time of the First Pan-American Aeronautic Exposition. Following this meeting Mr. Sperry was consulted in regard to Mr. Cautley's suggestion regarding the subject of stabilizers and gave the opinion that it would be better to consider the subject of Aeronautic Engines.

At the informal meeting held in December 27th, at the Aero Club of America, at which were present Messrs. Alan R. Hawley, Henry Woodhouse and Augustus Post of the Aero Club of America, and Herbert Chase of the S.A.E., the question of the best time for the proposed technical session was discussed and it was agreed that it should take place on the afternoon and evening of Friday, February 9th, 1917, the second day of the Aeronautic Exposition. Eeach day of the Exposition is given to a different subject.

It was the sense of this meeting.

THAT the afternoon should be devoted to consideration of the general subject of standardization in the aeronautic field and that if possible the Aeronautic Engine Division of the S.A.E. Standards Committee should convene at this meeting and take general charge of its proceedings.

THAT the afternoon session should be followed by an informal dinner.

THAT the evening session should be devoted to short papers on the subject of aeronautic engines.

It was suggested that Mr. F. G. Diffen of the Erie Specialty Company, Erie, Pa., might be willing to prepare a short paper on the possibility of standardization of aeroplane parts and accessories. The hope was expressed that Mr. Henry Souther would preside at the afternoon standardization session and would arrange for representatives of the Army and Navy to give their views as to what parts of aeroplanes should be standardized and to suggest along what lines such standardization work should proceed. This would be followed by a general discussion in which manufacturers would participate.

For the evening session it was suggested that representatives of the Army and Navy should be requested to give an outline of the general requirements of the War and Navy Departments in regard to the types and construction of aeroplane engines best suited to their requirements and that these summaries should be followed by brief papers by prominent aeronautic engine experts stating how these requirements could best be met. This would be followed by a general discussion.

Other subjects which were mentioned for consideration, if time should permit, were considered and it was suggested that the following might be secured:

A paper by Dr. Albert F. Zahm, on Some Phase of Aero-Dynamics.

A paper by Lieut. Com. John H. Tower, on Naval Seaplanes.

A paper by Captain Virginius E. Clark, U. S. A. on Military Aeroplanes.

A paper by Major Charles de F. Chandler, U. S. A., on Military Kite Balloons.

A paper by W. Starling Burgess of the Burgess Company, Marbelhead, Mass., on Hydroaeroplane Construction.

A paper by Professor F. W. Pawlowski of the University of Michigan, on some subject related to aeronautics.

A paper by Elmer A. Sperry, on Instruments for Aerial Navigation.

Mr. Post stated that it would be possible to hold the proposed technical session in rooms that could be provided for the purpose in the Grand Central Palace Exhibition Rooms where the Aeronautic Exposition is to be held. He also stated that it would be possible to arrange for the informal dinner in a room adjacent to the Palace Exhibition Rooms.

Personal Pars

Art Smith, Fort Wayne's "birdboy" and world-famous aviator, was entertained by the Fort Wayne Real Estate Exchange at dinner. The aviator, who is spending a week with his parents more than any other that has since been bein the city in which he was born and reared, studded medal given him here four years ago responded to a toast in honor of his old home town and stated that he prized the diamond stowed on him.

Miss Law Used Goodyear Tires

Although the service demanded of aeroplane tires is quite different from that expected from automobile tires, aviators count their aeroplane tires among the most important parts of their equipment. They help to get up high speed before leaving the ground and provide a cushion to absorb the shocks of landing. Aeroplanes in landing often hit the ground at a speed of eighty miles an hour, therefore the tires must be resilient to a high degree to resist the lateral thrusts that occur when the machine hits the earth. Miss Ruth Law, the daring aviatrix, who recently made a record flight from Chicago to New York, used an aeroplane equipped with Goodyear aeroplane tires.

Detroit to Have Aerial Reserve Next Spring

Organization of an aerial reserve for Detroit will be perfected next spring by the Aero Club of Michigan, which donated to the Michigan National Guard the aeroplane used at Camp Ferris for instruction of an aviation corps.

This announcement was made by S. D. Walton, one of the directors of the club. General John P. Kirk has advised officials of the club that the aeroplane will be returned to the donators, as the federal government refused to pay for repairs. New wings, rudder, elevator and other parts would be necessary, at a cost estimated at $5,000.

This machine, one of the safest types, will be used for instructing the members of the reserve.

Members ot the Aero Club immediately behind the work of organizing the reserve in this city are R. A. Alger, H. B. Joy, H. E. Coffin, R. D. Chapin, W. E. Metzger, Mason Rumney, Alvan Macauley, Kirk B. Alexander, Major Dumas, F. A. Hinchman and S. D. Waldon.

Aircraft in War

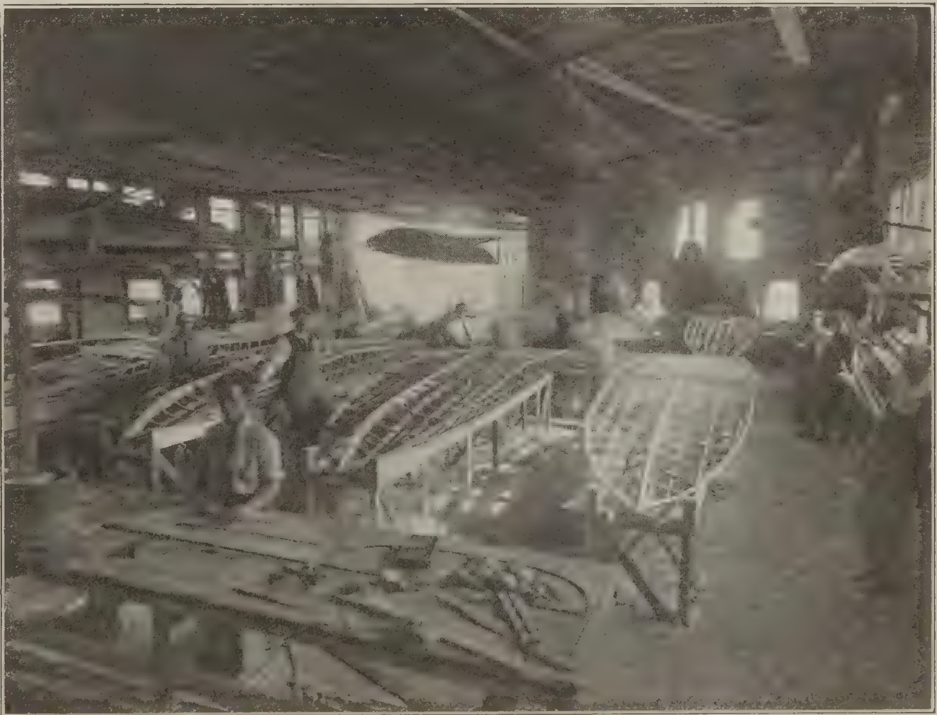
"Aircraft in War" is the title of a volume from the pen of J. M. Spaight, LL.D., author of "War Rights on Land," which treats quite comprehensively the legal and juridicial aspect of the use of aircraft in war. Mr. Spaight is looked upon as one of the foremost authorities on aerial law in England, and he was largely responsible for the drafting of the Aerial Navigation Acts of 1911 and 1913.

Though the volume was written just prior to the opening of the cataclysm in Europe, many of the author's prognastications have materialized, and his proposed remedies have been adopted in more or less detail.

Commencing with the references to aerial warfare at The Hague conference in 1908, Mr. Spaight follows in detail the legislative references to this subject, and the reader of his book is given a very thorough comprehension of the action taken by various countries toward outlining a general policy covering combat in the air, which policy would undoubtedly have been transferred into international obligations by this time, had it not been for the outbreak of war.

Aerial warfare yet remains in the domain of the "law of nations," that is, its conduct is governed by the principles undefined in many respects, yet generally recognized, of International Law, just as the conduct of land war was before The Hague Reglément of 1899. But notwithstanding this fact, the various codes outlined in this volume have a special reference and will undoubtedly receive serious consideration after the peace acts have been signed, and when legislators are making laws governing the newest and most dynamic phase of warfare—the war in the air.

We cordially commend the volume to all students of aerial navigation in its broad aspects. The book is published by the Macmillan Co., and sells for $2.00.



Pontoons in course of preparation for hydroaeroplanes for the Navy at the plant of the Burgess Co., Marblehead.

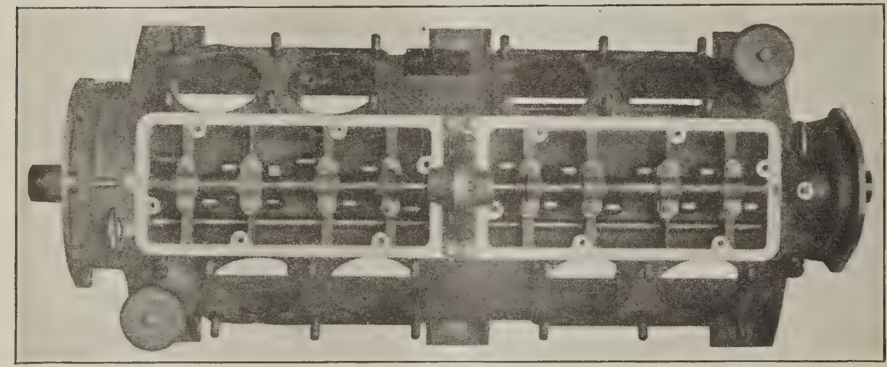
THE STURTEVANT MODEL 5A, 140 H. P., AERONAUTICAL ENGINE

THE Sturtevant 140 h.p. eight-cylinder aeronautical motor, Model 5A Type 8, represents the perfected development of many years' experience in building aeronautical motors. The workmanship and material entering into the construction of these motors are of the highest order. All parts are accurately machined and absolutely interchangeable. All bearing surfaces are ground to exact size and perfect finish.

Heat treatment of the high grade alloy steels has been the subject of exhaustive study on the part of Sturtevant engineers, with the result that important improvements in methods have largely increased the strength of these various materials, at the same time reducing the weight of the several parts.

Forging and all other processes in the manufacture of these motors are accomplished in the Sturtevant works at Hyde Park; in fact, with the exception of certain accessories, all parts of the motor are made, assembled and tested in one plant.

A large, completely equipped test house is maintained with facilities for testing the motors under conditions closely approximating actual service requirements. All motors are subjected to rigid preliminary tests for several hours at full speed, full load, after which they are taken apart, examined and later given a strenuous final run for several hours under full load, full speed conditions.


Camshaft and upper half of the base.

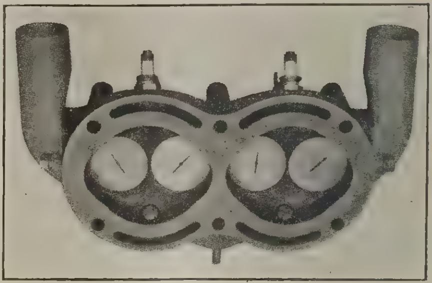
The general description of this engine as given out by the manufacturers is as follows:

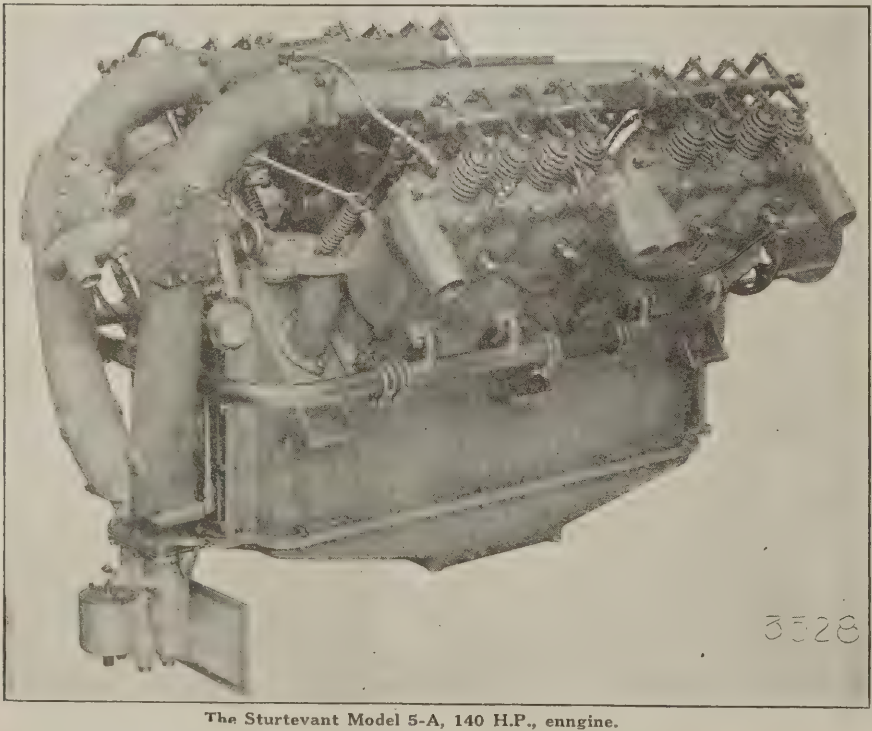
General: These motors are of the eight-cylinder "V" type, four-stroke cycle, water cooled, having a bore of 4" and a stroke of 5½", equivalent to 102 mm., × 140 mm. The normal operating speed of the crankshaft is 2,000 r.p.m. The propeller shaft is driven through reducing gears which can be furnished in different gear ratios. The standard ratio is 5:3, allowing a propeller speed of 1,200 r.p.m.

The construction of the motor is such as to permit of the application of a direct drive. The change from the direct drive to gear drive, or vice versa, can be accomplished in approximately one hour. The direct drive construction is particularly adaptable to dirigible work.

Cylinders: The cylinders are cast in pairs from an aluminum alloy and are provided with steel sleeves, carefully fitted into each cylinder. A perfect contact is secured between cylinder and sleeve; at the same time a sleeve can be replaced without injury to the cylinder proper. No difficulties due to expansion occur on account of the rapid transmission of heat and the fact that the sleeve is always at higher temperature than the cylinder. A moulded copper asbestos gasket is placed between the cylinder and the head, permitting the cooling water to circulate freely and at the same time insuring a tight joint.

Cylinder Heads: The cylinder heads are cast in pairs from an aluminum alloy and contain ample water passages for circulation of cooling water over the entire head. Trouble due to hot valves is thereby eliminated, a most important consideration in the operation of an aeroplane motor. The water jacket of the head corresponds to the water jacket of the cylinders and large openings in both allow the unobstructed circulation of the cooling water. The cylinder heads and cylinders are both held to the base by six long bolts.


Cylinder heads are cast in pairs.



The Sturtevant Model 5-A, 140 H.P., enngine.

Valves: The valves are located in the cylinder heads and are mechanically operated. The valves and valve springs are especially accessible and of such size as to permit high volumetric efficiency. The valves are constructed of hardened tungsten steel, the heads and stems being made from one piece. The valve rocker arms located on the top of the cylinder are provided with adjusting screws. A check nut enables the adjusting screw to be securely locked in position, once the correct clearance has been determined. The rocker arm bearings are adequately lubricated by a compression grease cup. Cam rollers are interposed between the cams and the push rods in order to reduce the side thrust on the push rods.

Valve Springs: A system of double springs is employed which greatly reduces the stress on each spring and insures utmost reliability. A spring of extremely large diameter returns the valve; a second spring located at the cylinder base handles the push rod linkage. These springs which operate under low stress are made from the best of steel and are given a special double heat treatment.

Pistons: The pistons are made from a special aluminum alloy; are deeply ribbed in the head for cooling and strength and provided with two piston rings. These pistons are exceedingly light weight in order to minimize vibration and prevent wear on the bearings. The piston pin is made of chrome nickel steel, bored hollow and hardened. It is allowed to turn, both in piston and connecting rod. The piston rings are of our own special design, developed after years of experimenting in aeronautical engines.

Connecting Rods: The connecting rods are of "H" section machined all over from forgings of a special air hardening chrome nickel steel which, after being heat treated has a tensile strength of 280,000 pounds per square inch. They are consequently very strong and yet unusually light and being machined all over are of absolutely uniform section, which gives as nearly perfect balance as can be obtained. The big ends are lined with white metal and the small ends are bushed with phosphor bronze. The connecting rods are all alike and take their bearings side by side on the crankpin, the cylinders being offset to permit of this arrangement.

Crankshaft: The crankshaft is machined from the highest grade chrome nickel steel properly heat treated in Sturtevant furnaces in order to obtain the best properties of this material. It is 2¼" in diameter (57 mm.) and bored hollow throughout, insuring maximum strength with minimum weight. It is carried in three large, bronze backed white metal bearings. A new method of producing these bearings insures a perfect bond between the two metals and eliminates breakage.

Base: The base is cast from an aluminum alloy. Great strength and rigidity is combined with light weight. The sides extend considerably below the centerline of the crankshaft, providing an extremely deep section. At all highly stressed points, deep ribs are provided to distribute the load evenly and eliminate bending.

Sump: The lower half of the base is of cast aluminum alloy of extreme lightness. This collects the lubricating oil and acts as a small reservoir for same. An oil filtering screen of large area covers the entire surface of the sump.

Propeller Shaft: The propeller shaft is carried on two large annular ball bearings driven from the crankshaft by hardened chrome nickel steel spur gears. These gears are contained within an oil-tight casing integral with the base on the opposite end from the timing gears. A ball thrust bearing is provided on the propeller shaft to take the thrust of a propeller or tractor as the case may be.

In case of the direct drive a stub shaft is fastened direct to the crankshaft and is fitted with a double thrust bearing.

Camshaft: The camshaft is contained within the upper half of the base between the two groups of cylinders, and is supported in six bronze bearings. It is bored hollow throughout and the cams are formed integral with the shaft and ground to the proper shape and finish. An important development in the shape of cams has resulted in a maintained increase of power at high speeds. The gears operating the camshaft, magneto, oil and water pumps are contained within an oil-tight casing and operate in a bath of oil.

Lubrication: Lubrication is of the complete forced circulating system, the oil being supplied to every bearing under high pressure by a rotary pump of large capacity. This is operated by gears from the crankshaft. The oil passages from the pump to the main bearings are cast integral with the base, the hollow crankshaft forming a passage through the connecting rod bearings and the hollow camshaft distributing the oil to the camshaft bearings. The entire surface of the lower half of the base is covered with a fine mesh screen through which the oil passes before reaching the pump. Approximately one gallon of oil is contained within the base and this is continually circulated through an external tank by a secondary pump operated by an eccentric on the camshaft. This also draws fresh oil from the external tank which can be made of any desired capacity.

Carburetor: The carburetor is the Zenith duplex type. It is of a double barrel design with one float chamber and two jets, each supplying one group of four cylinders. It is located on the rear end of the motor beneath the level of the engine base, permitting of gravity fuel feed and is connected to the cylinders by means of special water jacketed aluminum manifolds, the water jackets being cast integral. This type of manifold not only provides the cylinders with an homogeneous mixture but increases materially the fuel economy. There is less carbon formed in the cylinders and the exhaust is noticeably clean. The carburetion is entirely unaffected by outside temperature changes, the latter being of great importance at high altitudes.

Ignition: Ignition is accomplished by two reliable eight-cylinder waterproof magnetos placed face to face between the two groups of cylinders. Each cylinder is provided with double ignition by means of two spark plugs located in water-cooled bosses on the sides of the cylinder heads. This feature not only increases the reliability of the motor in operation but in addition tends to improve operation and power at high speeds. The magnetos are synchronized by a vernier coupling allowing most accurate adjustment.

Cooling: The water circulation is accomplished by a centrifugal pump which delivers a large quantity of water through the cylinder jackets and maintains a uniform temperature around all parts of the cylinders. The water pump has been so designed as to permit easy adjustment of the packing gland.

Starting Crank: A starting crank is provided by which the motor can be readily started from the machine. The crank handle can be extended to pass through a control board.

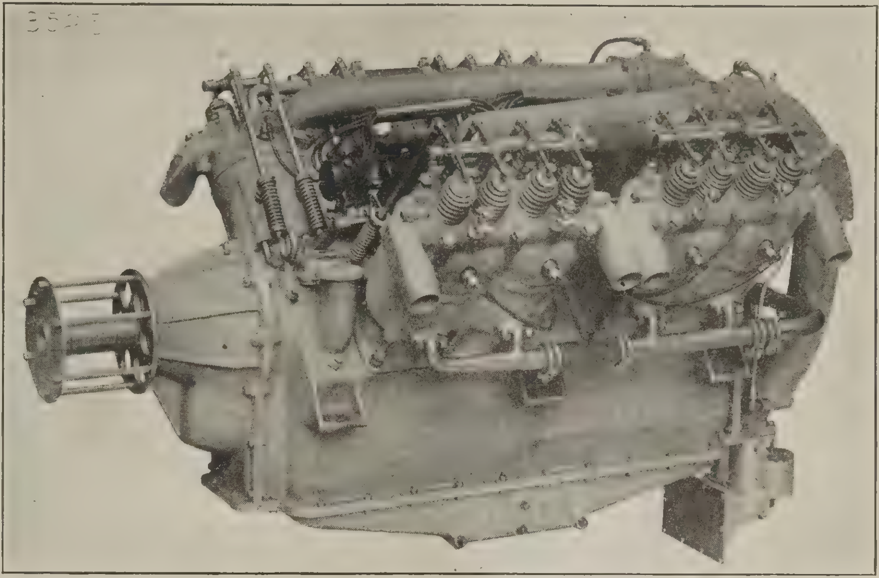
Self-Starter: The motor has been arranged to permit of the application of an efficient air starter if desired. Any other suitable starter will be applied.

Tachometer: A tachometer which gives accurate readings and which shows no vibration of the needle is supplied either with or without a positive revolution counter for checking purposes.

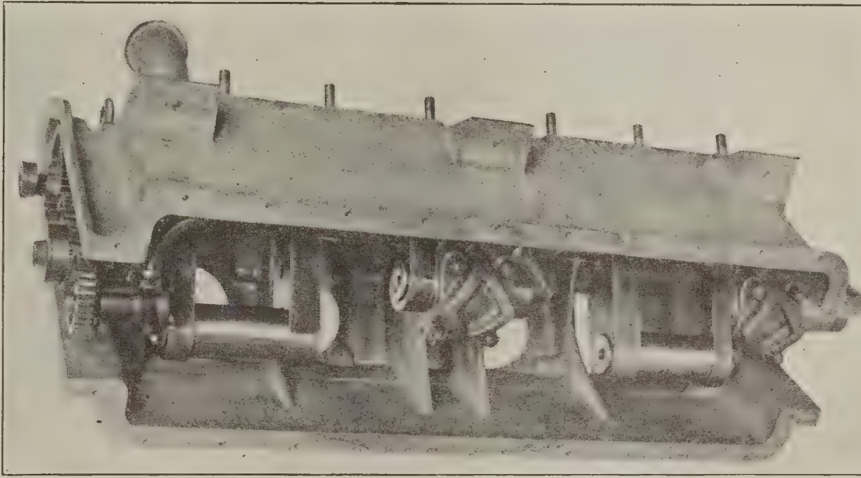
Weight: The weight of the motor complete with carburetor, magnetos, starting crank, propeller, hub flange and bolts, but not including radiator and propeller or water is 514 pounds. The corresponding weight including cooling water in engine is 550 pounds.

Specifications—Model 5A Type 8

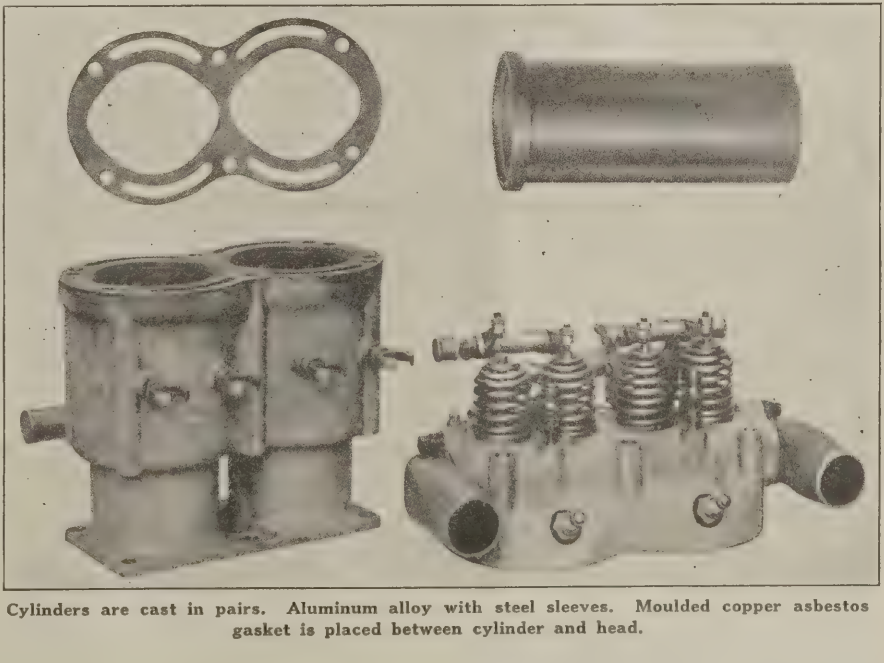
Horsepower rating, 140 at 2,000 r.p.m.
Bore, 4 inches = 102 mm.
Stroke, 5½ inches = 140 mm.
Number of cylinders, 8.
Arrangement of cylinders, "V."
Cooling, water. Circulation by centrifugal pump.
Cycle, four stroke.
Ignition (double), 2 Bosch or Splitdorf magnetos.
Carburetor, Zenith duplex. Water jacketed manifold.
Oiling system, complete forced. Circulating gear pump.
Normal crankshaft speed, 2,000 r.p.m.
Propeller shaft, ⅗ crankshaft speed at normal, 1,200 r.p.m.
Stated power at 30" barometer, 140 b.h.p.
Stated weight with all accessories but without water, gasoline or oil, 514 pounds = 234 kilos.
Weight per b.h.p., 3.7 pounds = 1.68 kilos.
Stated weight with all accessories with water, 550 pounds = 250 kilos.
Weight per b.h.p. with water, 3.95 pounds = 1.79 kilos.



The Sturtevant Model 5-A, 140 H.P., engine.



Crankshaft carried in three bronze backed white metal bearings.



Cylinders are cast in pairs. Aluminum alloy with steel sleeves. Moulded copper asbestos gasket is placed between cylinder and head.

The Pan-American Aeronautic Exposition

The First, Second and Third Floors Are Reserved for Aeroplanes, Motors and Accessories.

The Exposition will comprise the most up-to-date products of the American Aeronautic Industry and includes:

THE ARMY AND NAVY AERONAUTIC EXHIBITS.

NATIONAL GUARD AND NAVAL MILITIA SECTIONS.

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS' EXHIBIT.

AERO CLUB OF AMERICA & PAN-AMERICAN AERONAUTIC FEDERATION SALONS.

AERO COAST PATROL EXHIBIT.

AMERICAN SOCIETY OF AERONAUTIC ENGINEERS (Standardizing section).

INTERCOLLEGIATE SECTION.

AERO MAP & LANDING PLACE EXHIBIT.

WEATHER BUREAU EXHIBIT.

BUREAU OF STANDARDS EXHIBIT.

PAN-AMERICAN UNION EXHIBIT OF RELIEF MAPS, ETC.

COAST GUARD EXHIBIT.

POST OFFICE EXHIBIT OF MAPS & LOCATIONS OF 200 PROPOSED AERIAL MAIL ROUTES.

SMITHSONIAN INSTITUTE EXHIBIT.

DIRIGIBLE BALLOONS.

BALLOONS.

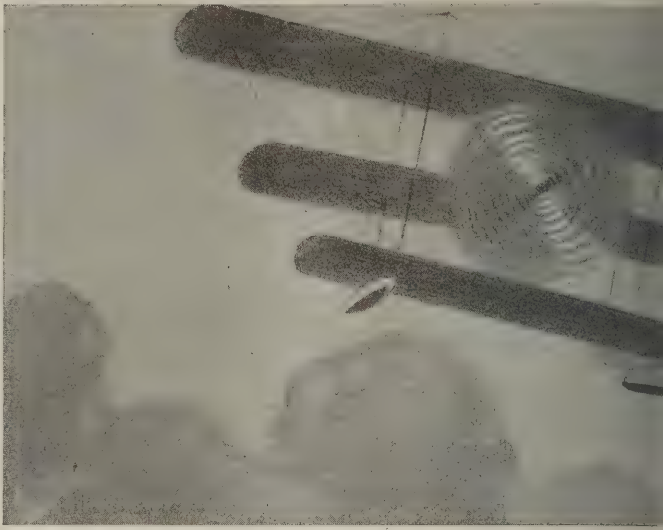
MOTION PICTURE HALL.

ASSEMBLY HALL.

PRESS ROOM.

The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos-Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.



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LIST OF EXHIBITORS

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Aerial Age Company.
Aeromarine Plane & Motor Company.
Aeronautic Library.
Benoist Aeroplane Co.
The Burgess Company.
Curtiss Aeroplane & Motor Corporation.
John D. Cooper Aeroplane Company.
Flying Association.
L. W. F. Engineering Company.
Samuel S. Pierce Aeroplane Corporation.
Sperry Gyroscope Company.
Standard Aero Corporation.
Sturtevant Aeroplane Company.
Thomas Bros. Aeroplane Company.
Wright-Martin Aircraft Company.

SECOND FLOOR

Aerial Age Company.
Ackerman Wheel Company.
Abercrombie & Fitch Company.
Bournonville Motors Co.
Champion Ignition Company.
Connecticut Aircraft Company.
Dayton Engineering Laboratories, Inc.
Dupont Company.
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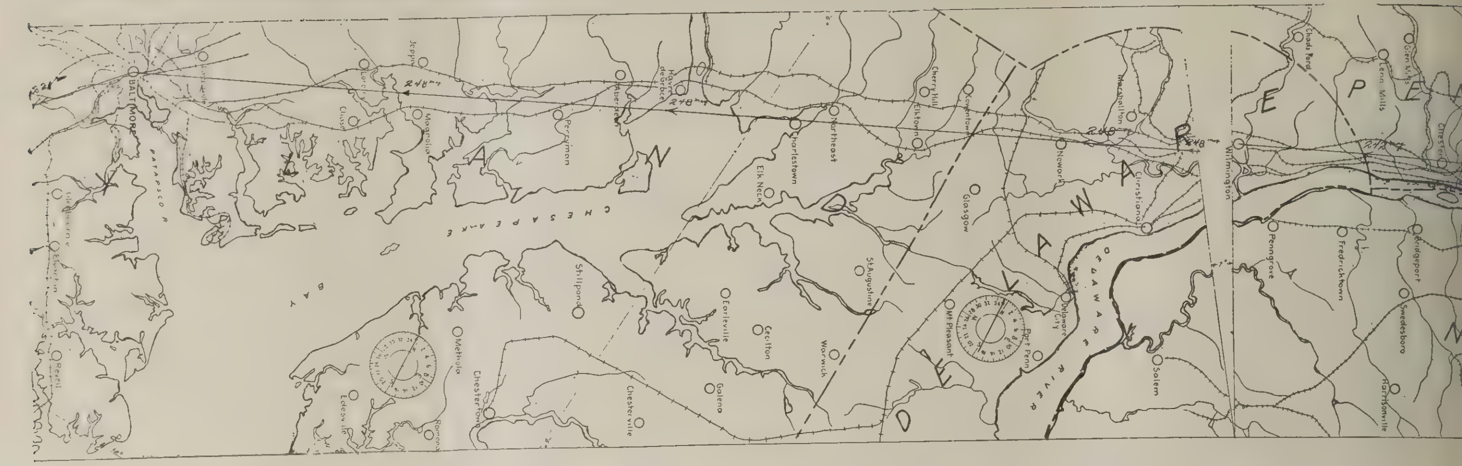
Springfield Motors Co.
Standard Parts Co.
Standard Screw Co.
Staten Island Aviation School.
Steel Fabrication Co.
Steel Products Co.
Stentnor Electric Co.
Taylor Instrument Company.
Trailmobile Co.
United States Rubber Company.
Valentine & Company.
Clarence Whitman.
Wisconsin Motor Company.
Charles D. Woodward.
World's Motor Company.



AERONAUTIC MAP FOR NEW YORK-NEWPORT NEWS TRIP

Prepared by **LAWRENCE B. SPERRY**

WE have pleasure in presenting our readers this week with a map showing the most desirable air route from New York to Newport News. The map was prepared under the supervision of Mr. Lawrence B. Sperry.

A map is being prepared of the Lincoln Airway, which Lieutenant-Colonel Squier has urged the Aero Club of America to establish in connection with the Transcontinental Aeroplane Contest, for which the club has set aside $20,000 for prizes. It will show a straight route from New York to San Francisco, but there will be lines leading from the main line to central landing places, like Erie, Cleveland and Detroit. Erie has already offered $10,000 for prizes for the Transcontinental Aeroplane Contest, and is ready to establish a suitable landing place for aeroplanes.

All the headings are magnetic on these maps, and the arrows indicate headings in either direction. Conventional signs will be adopted later after thorough consideration.

The true heading from one city to another is determined by projecting the line of flight between those two cities and then transferring this line by means of parallel rulers, to the nearest compass rose, from which the true heading is obtained. As the difference between the geographical and magnetic North Pole differs at various places on the earth's surface, it is necessary to correct frequently for this difference, which is known as "variation." As all of the headings on this chart have been laid out "magnetic," or with the variation taken into consideration, the pilot simply steers his craft on the charted headings. It will be noticed that wherever the variation is easterly, it is necessary to subtract from the true heading, and where westerly it is necessary to add the necessary number of degrees in order to get the proper indication.

AUTOMOTIVE ENGINEERING

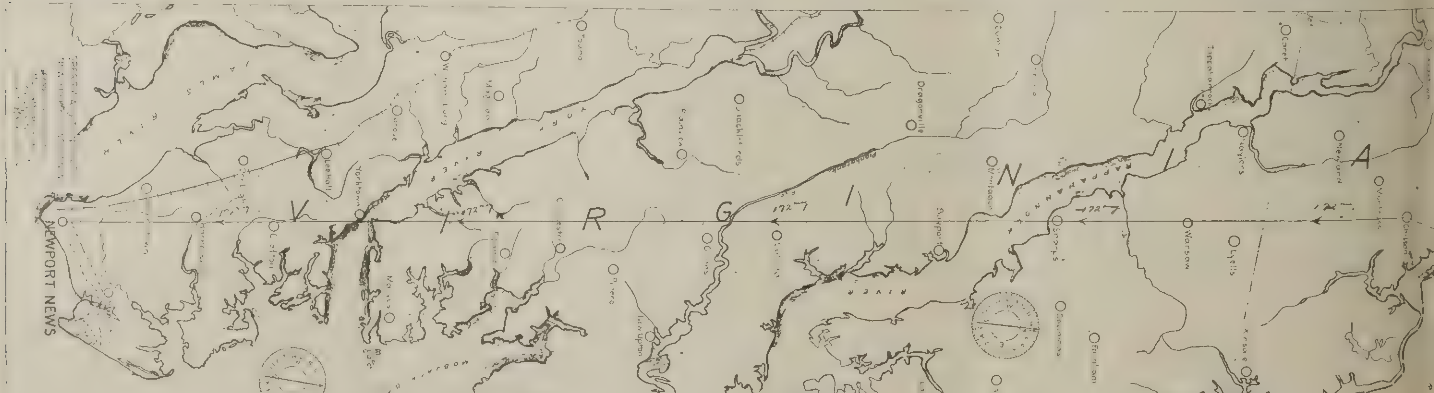
By **COKER F. CLARKSON**

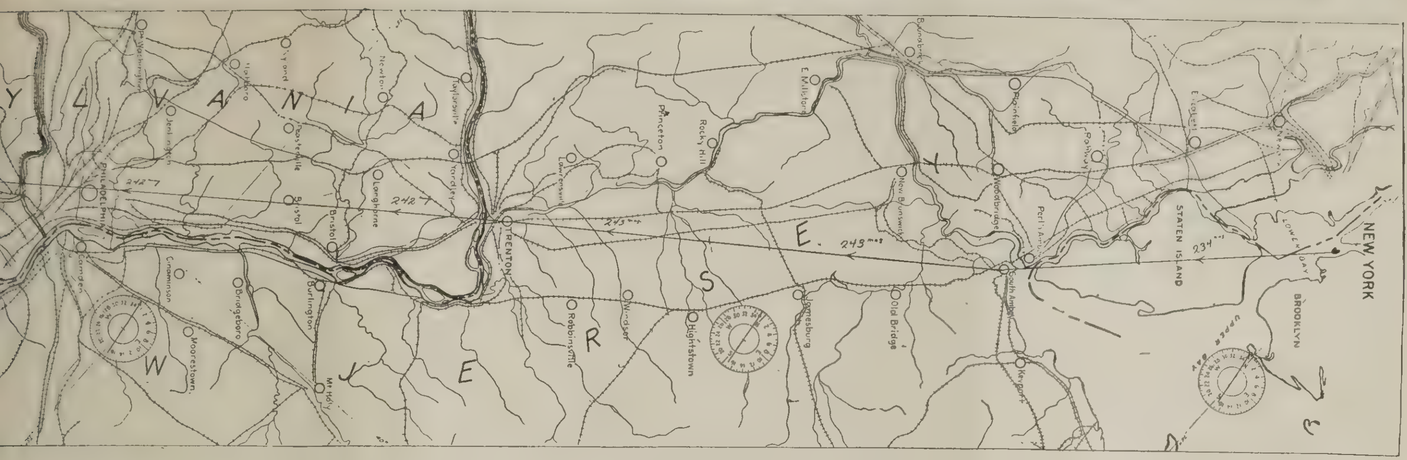
TO the scientist and the engineer we owe so much in our modern civilization that to withdraw the product of their labor would utterly cripple the activities of all but the most primitive beings. In no field is this more true than in that of transportation—a sphere in which the self-propelled vehicle, be it automobile, motor ship, tractor or aircraft, is all important.

The four great industries concerned with the production of these vehicles are largely dependent upon the activities of a group of highly trained technical men who may be properly called "automotive" engineers, since their field of endeavor is that of the design of self-propelled or "automotive" vehicles. The largest of the four industries is that related to the automobile, and a very large percentage of the engineers whose knowledge and creative ability are, in great part, responsible for the inception and maintenance of the motor car industry are members of the Society of Automobile Engineers.

It is evident that the S. A. E. has kept pace with the growth of the automobile industry when it is realized that a group of engineers numbering about 100 ten years ago has now grown into a great and widely diversified organization of over 2,000 members.

Several years ago the great value of standardization work and its effect upon the growth of the industry were foreseen by the S. A. E., but it is probable that few of the Society members then realized how many standards would be created in a relatively short time, or how pronounced an effect their formulation would have in decreasing the cost of production in the automobile and accessory field. For example, the standardization of steel specifications, now widely used, has been instrumental in effecting a decided decrease in the price of steels, more especially those of the alloy type. These were formerly sold under brand names, but owing in part to the adoption of S. A. E. standard specifications are now obtainable from even the smaller steel companies, in many instances from stock. The fact is that the demand created for high-grade steels in the automobile industry has resulted in tremendous developments in the production of such steel in this country. In this development the S. A. E. has played an important part. As a result the steel industry has been able to meet the demand for alloy steel created by the war and has, at





the same time, developed resources that will become a tremendous asset to the nation in case of an attack by a foreign power.

The close association of the work of the automobile engineers with that of the aeronautic and the tractor engineers, as well as with that of engineers engaged in the design and construction of internal combustion engines for motor ship and stationary power units, is becoming well recognized. The community of interests in these diversified fields has already lead to a most desirable working arrangement between the S. A. E. and organizations representing the respective fields. The consolidation of the engineering membership of these societies is already well advanced. At the meeting of the S. A. E. to be held in New York on January 11th, a constitutional amendment will be considered providing for a change in name from the Society of Automobile Engineers to the *Society of Automotive Engineers* and for representation of the newly allied fields of engineering activity on the Council of the Society. The American Society of Aeronautical Engineers and the Society of Tractor Engineers have voted in favor of the proposed consolidation and the executive committee of the National Association of Engine and Boat Manufacturers has recommended that the engineers associated with its company members, apply for membership in the S. A. E. and co-operate fully in what standardization shall be feasible in the motor boat and motor ship design and production. Similar action will probably be taken by the National Gas Engine Association and the American Society of Agricultural Engineers as to farm tractor and stationary engine standardization. Among the members of all the organizations there is a realization of the great benefit that will result from united effort.

One of the greatest benefits resulting from membership in the Society is the opportunity it affords for meeting other engineers and the broadening influence resulting from interchange of views. There are many other benefits among which may be mentioned: receipt of all S. A. E. publications, including data sheets, the monthly *Bulletin* and the volumes of transactions published semi-annually; prestige naturally accruing from affiliation with an engineering organization of standing, and the possibility of securing recognition of engineering ability through valuable contribution to the Society's publications.

The Federal Government has, as a result of the widespread demand for national preparedness come to recognize in the S. A. E. an organization whose co-operation is of the utmost importance to both the Army and Navy Departments. The lack before the war of similar co-operation between some of the European governments and engineering organizations in their countries similar to the S. A. E. led to much needless delay and inconvenience following declaration of war. This condition of affairs will be largely avoided in this country as a result of the working relations between the Federal Government and the S. A. E. and other engineering organizations. During the year just closing the Society has entered into active co-operation with the Government and rendered service of great value in many directions. This action is believed to be without precedent. The Truck Standards Division is working closely with engineers of the Government in the development of standard specifications having to do with a truck suitable for motor-transport purposes. Another committee is in quite as close touch with engineers of the War and Navy Departments in the matter of standardization of airplane accessories and engine parts. This has emphasized, as might have been expected, the fundamental interrelation of the fields of motor-car, aeronautic, tractor and motor-ship engineering and indicated clearly the desirability of closer association of men engaged in these fields.

The annual meeting of the Society to be held January 11th in New York at the time of the automobile show, will reflect in its program the newer activities of the organization, as will be seen from the titles of the papers to be read. These are:

Some Problems in Aeroplane Construction—Capt. Virginius E. Clark, U. S. A., Capt. T. F. Dodd, O. E. Strahlmann.

The Ultimate Type of Tractor Engine—H. L. Horning.

Dynamic Balance of Rotating Parts and Dynamic Balancing Machines—F. Hymans.

Problems in Dynamics of the Automobile—N. W. Akimoff.

Some Essential Features of High-Speed Engines—A. F. Milbrath.

Heat-Balance Tests of Automobile Engines—Prof. Walter T. Fishleigh and Walter E. Lay.

Aerial Navigation Over Water—Elmer A. Sperry.

The Society will also hold during the First Pan-American Aeronautical Exposition to be held at Grand Central Palace, February 8-15, a technical session at which will be presented discussions by leading designers on the present developments and possibilities of aeroplane engines.

The Standards Committee of the Society is now being reorganized to provide for carrying on additional standardization work in the aeronautic field, and inaugurating the same work in motor ship and in tractor engineering.

The number of the sections of the Society, which hold monthly meetings at the important industrial centers throughout the country, has now been increased to seven by the establishment of the Buffalo Section, which will devote a large amount of attention to motor boat and aviation problems, particularly the latter, as well as to motor car engineering. A further development of the broadened scope of work will be the establishment at an early date of a Farm Tractor Section with headquarters at Minneapolis.

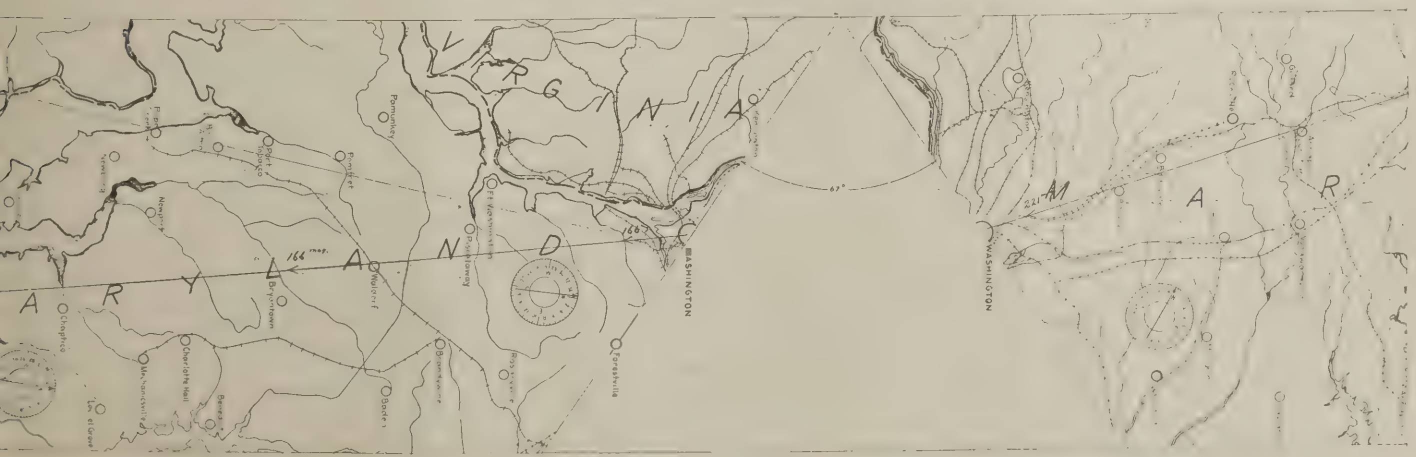
Aero Club of Canada Organized

The Aero Club of Canada has been organized and sanctioned by Government charter. The club which has been brought into existence largely to encourage and assist those desiring to take up aviation in order to render war service, will devote its energies also to the development of aeronautics generally.

The president of the new club is Colonel Wm. Hamilton Merritt, who has long been urging the establishment of training schools for aviators in the Dominion. Lieut.-Colonel J. B. Miller, Toronto, was elected vice-president; Adam F. Penton, Toronto, honorary secretary; Capt. D. A. Cameron, Toronto, honorary treasurer; Lieut.-Colonel H. C. Cox, vice-president for Ontario; Carl Riordan, Montreal, vice-president for Quebec; W. R. Allen, of Winnipeg, vice-president for Manitoba; F. C. Ritchie was appointed permanent secretary, and the club will have offices in the Lumsden Building, Toronto. Three additional directors are yet to be chosen and vice-presidents for the rest of the provinces.

Yale's Aviation Plans

Trubee Davison, president of the Yale Aero Club, has induced about all the members to become prospective members of the school of aviation to be established next spring by the American Trans-Oceanic Company at some point on the northern shore of Long Island Sound, probably at either New Haven or New London. There are a score of members of the club who are competent aviators at present who go to New London two or three times a week and practice with the Government flying boats located there. Several will take a course at the new school to perfect themselves as military observers and aerial photographers.



FOREIGN NEWS

FRANCE

Georges Carpentier, the heavyweight boxing champion of France, is now on a furlough from the war front, where he has been serving as an aviator in the French Army.

It is reported in American sporting circles that he has signed a contract to come to this country to engage in a boxing exhibition with some American fighter, and that a large portion of his share will be given to some charity in aid of French war sufferers. The report is not as yet absolutely confirmed as it is generally believed that Carpentier would be of more value to his country in active service at the front than by coming to this country and gaining but a few thousand dollars for the war relief.

It has been confirmed that Lieut. Herteaux brought down on the 26th of December his fifteenth enemy aeroplane. This happened over Vaux wood. On the same day Sub-Lieut. Guynemer brought down at a point east of Misery his twenty-fourth German aeroplane, and on the 27th he vanquished his twenty-fifth air enemy a little to the south of Maisonette. Another German aeroplane was brought down the same day, but the name of the victor in the fight is not mentioned in the report.

At two o'clock on the afternoon of December 26th, thirteen naval seaplanes of the British Naval Aeroplane Corps bombarded the blast furnaces at Dillingen, throwing down 1,100 kilograms of projectiles. Later on the same French aviators conducted various bombing operations. The railroad stations at Montmedy and Pierrepont, east of Longuyon, received a large number of projectiles. Bombs to the amount of 720 kilograms were thrown on factories at Thionville and Joeuf, in the valley of the Briey. Eighty-two bombs of 120 milimeters were thrown on the blast furnaces at Rombach, and 60 more on the furnaces at Hagondange.

A French dirigible dropped bombs on the blast furnaces at Hagondange, and another dirigible dropped bombs on metal factories in Neukirchen.

GERMANY

We reproduce below, by kind permission of the *Aeroplane*, a photograph of the Halberstadt biplane, a machine which the *Aeroplane* states is fast superseding the far-famed Fokker.

We quote from the *Aeroplane:* "Boelcke, Immelman and Buddicke having had their flights—and deaths, too—on the Fokker monoplane, the mount of the new breed is by preference the single-seater Halberstadt fighting biplane, turned out by the former German Bristol Works, having taken the name from their situation. The biplane has a fusilage on Morane-Fokker outlines with an enlarged rudder, a huge nose telling the presence of a high-powered Mercedes or Benz engine, likely of 220 h.p., and staggered planes. As the accompanying picture illustrates, the number of struts seems yet important to the German mind.

According to the official report of Germany for December 28th, the Allies lost eigth aeroplanes "in aerial engagements or through the operations of our defensive aircraft."

GREAT BRITAIN

If we may depend upon the opinion expressed in the British aeronautical press, the appointment of Admiral Jellicoe to the position of First Sea Lord of the Admiralty should greatly cheer "those concerned with sea flying." Sir John Jellicoe has taken considerably more than a passive interest in aeronautical affairs ever since he took command of the Grand Fleet. In the very earliest days of the war he personally investigated the possibilities of both land and seaplanes, when naval pilots on shoregoing machines were gallantly flying over the coast of the Scottish Islands on the lookout for enemy submarines, and since then, he has kept closely in touch with the work of such seaplane carriers as were with his fleet.

However makeshift a job these carriers may be, the gallant and capable officers aboard them may comfort themselves after all their neglect and discouragement from the Admiralty, with the thought that they have done something to instruct the new head of the Navy in the uses and abuses of seaplanes, and one only hopes they they have had full opportunities of impressing on him the limitations under which they have had to work, as regards aeroplane engines, ships and accessories.

At any rate, one knows that Sir John Jellicoe entirely sympathizes with the uses and users of aircraft, and it is even rumored that he once went so far as to express approval of a new type of overcoat designed and worn by an R. N. A. S. officer.

The following table from our contemporary, *The Aeroplane,* gives the number of aeroplanes "accounted for" from June 1st to December 1st, as shown in the daily official reports of the British, French and German headquarters:

	British	French	German
June	7	28	37
July	48	31	86
August	26	42	121
September	48	68	206
October	42	25	104
November	32	4	112
Total	203	198	666

The British figures do not admit those aeroplanes "claimed" to have been driven down by the Germans; nor probably those smashed behind the British lines, nor those returning with dead or wounded pilots or passengers, whereas the German figure is made up of the claims of both British and French pilots.

The news that Lieutenant H. R. Deighton Simpson, of the Royal Flying Corps, British Army, a son of Henry W. Simpson, lawyer, of No. 160 Broadway, had been killed while flying in England, which was published in a cable despatch in the *Herald,* was a shock to friends of the family. Lieutenant Simpson, while he received most of his education in England, was well known in Port Chester, where his parents live, and also at Harvard University, where he was a student at the outbreak of the European war.

Lieutenant Simpson was twenty-two years old. He was at Eton College, Windsor, England, until the early part of 1914, when he came to this country and entered Harvard. When the war began the young man left Harvard and went to Sandhurst, England, and was graduated as a second lieutenant. He was attached to the Sixth Dragoons. Then he studied aviation and joined the Royal Flying Corps. He was mentioned in despatches on January 1, 1916, for "gallant and distinguished conduct."

British seaplanes have destroyed a vital link in the Turkish railroad communications in Asia Minor, the Chicaldar bridge, across the Damihan River, according to an official announcement made by the Admiralty.

The destruction of the bridge, which is eighteen miles east of Adana, cuts off not only the Bagdad main line, but the Syrian lines from railroad connection with western Asia Minor and a supply base for the Turkish armies in the Caucasus, Mesopotamia, Palestine and Arabia.

JAPAN

The following is from the *Aeronautic World,* of Tokyo, Japan:

The Grand Military Maneuvers were held in Kyushu in the presence of H. I. M. the Emperor, and several new features were introduced for the occasion. In past maneuvers, only six or eight aeroplanes were used, but on the last occasion sixteen flying machines participated. The defending and invading armies each had eight machines, and the scouting by the air pilots was a big factor for both the invading and defending armies. The aeroplanes were used for night scouting, and for the first time spark bombs were used by the pilots in watching the moves of the opposing parties at night.

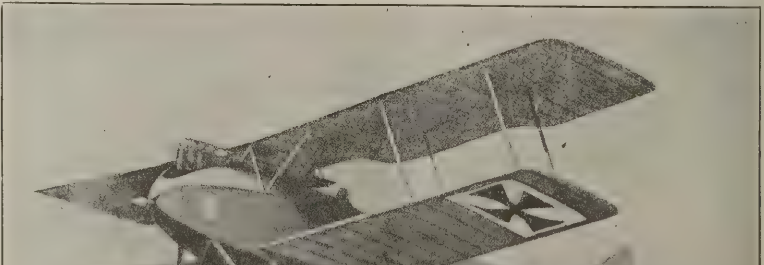
The military review marking the close of the Grand Maneuvers at Fukuoka was held at the military grounds in the suburbs on the 16th of November. The fifteen aeroplanes which participated carried out a circular flight over the ground in front of the Imperial stand, keeping a distance of about three hundred metres.

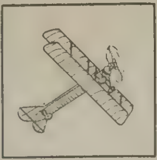
The four army aeroplanes of the Japanese air corps flew from Tokorozawa to Fukuoka, about four hundred miles, on the 2nd of November.

The appearance of a biplane over the city of Tokyo recently attracted more than the usual amount of notice because it flew at a height not more than 250 feet and seemed unlike the type used by the Army, to which the citizens have become accustomed. This was a machine designed by Dr. Kishi a Tokyo physician, who is also the designer of the engine, which was locally made. This is the first Japan made aeroplane and it is safe to say that henceforward they will follow in rapid succession.

The Army and Navy are progressing steadily with their work in aviation. This has been achieved so far at no small cost in life, the Navy having lost five officers and the Army six, according to available records. Four civilian airmen have been killed, so that the toll of life has been high, considering the fact that Japan has done very little with the new art in comparison with her foreign contemporaries. On the battle fronts in Europe at the present time there are over five thousand machines and thousands more in reserve, while an army of airmen is being trained. Europe is creating as fast as she is destroying.

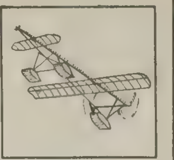
The latest development in German aeronautics —the Halberstadt, single seater biplane.





MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz



CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

A Model Ornithopter

The ornithopter drawings which we give this week are taken from a French model.

The drawings show the wing flapping mechanism quite clearly, and need no further explanation. The model is constructed of aluminum and steel wire. The motor rod is a piece of aluminium tubing with a steel shock absorber in front. The leading edges of the planes are aluminium tubing, and the ribs and rear edges steel wire, the wing has thus a (comparatively speaking) rigid leading and flexible trailing edge. The aluminium motor rod soon collapsed, and other minor breakages occurred, and but little success was obtained with the model as first purchased. A hollow spar (of greater length) was substituted for the aluminium tubing, and a few minor alterations were made, and in the end a flight of some 40 feet was obtained hand launched. Unfortunately these experiments were made some time ago, and I can only remember some of the chief deductions I arrived at; they were that the gearing should be done away with, since it appeared to absorb at least 50 per cent. of the energy, that two pairs of wings should be used instead of one, and that the rubber springs for accelerating the down stroke were a great mechanical disadvantage and that some other means should be devised of obtaining the same result. All attempts without the use of such were, however, an absolute failure, and it appeared an absolutely essential feature of successful ornithopter flight that something in the nature of a stroke-accelerator was absolutely necessary. The model was also tried with the rubber springs accelerating the *up stroke,* but with what result I cannot now remember, but I seem to have some kind of recollection that it was rather successful, although on the face of it, this appears to be a somewhat absurd conclusion.

I should strongly recommend anyone about to try any experiments with such models to proceed on the following lines: For the motor rod or backbone use a *very* light hollow spar some 3 ft. long, tapering, of course, towards both ends. This should be built up of two half ⊔ shaped sections joined centrally and not one complete ⊔ section with a piece along the top; it can be of either a square or oval section. Use no gear but two rubber motors, extending nearly the full length of the *fuselage,* employ two pairs of wings, one at each end of the motor rod. The length of the rubber motor will thus be the length of the motor rod minus about half the wing breadth. Balance with a horizontal and vertical fin (position alterable), placed somewhere between the wings, say about midway. Mount the model on wheels, say one in front and two behind, using featherweight wheels, and the lightest steel wire chassis that will support the weight of the model. Experiment with it on the smoothest surfaces obtainable. Such a model bears but little resemblance to a bird, but that has nothing to do with the matter. We want first of all a model which (from our past knowledge of aviation model work), appears most likely to fly. The machine is essentially designed as a flying-stick of the flapping wing type. When we have obtained some success with such a type, then we can proceed to elaborate. It is the crudest form of flapping flight, but I am quite sure of one thing, and that is that *in the first instance* success will not be obtained by attempting to build a model entirely on bird-like lines.

Valvular Wings

It has often been asserted that the wings of birds are so constructed that the air on the down stroke cannot pass through the feathers, whereas on the up-stroke it can. If this were so the wing would obviously act as if it were fitted with valves. The chief and only evidence that we know of to support this theory is that whereas it is quite easy to thrust one's finger through the wing from the upper side, it is quite a different matter to do this from the lower. In the case of bats, flying foxes, etc., it is self evident that no such theory can be applied.

(*To be continued*)

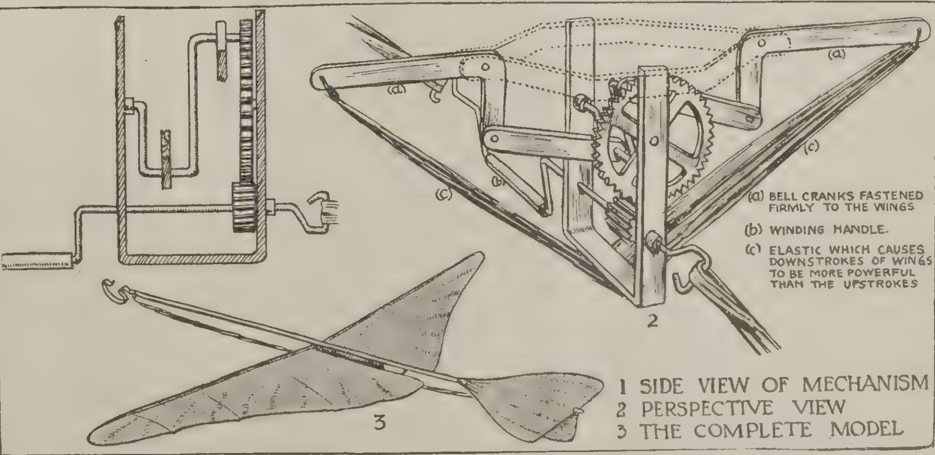
Illinois Model Club

A special speakers' meeting was called Friday, the 22nd, by A. E. Nealy, chairman of the social activities committee. This was the first of a series of meetings to be held this winter for which several good speakers have already been procured.

Mr. Glenn Muffly, of the Muffly Motor Co., was the first speaker. Mr. Cook then spoke on "The Modern Trend of Airplane Design." Mr. Walter L. Brock gave a very interesting talk on the design of cross-country machines. To show the appreciation of the Illinois Model Aero Club for his interest and encouragement, Mr. Charles Dickinson, president of the Aero Club of Illinois, was presented with I. M. A. C. pin by President W. H. Hitt in behalf of the club.

The next special speakers' meeting will be held some time in January.

Mr. Wm. B. Stout, founder of the I. M. A. C., spoke at a dinner given to "The Sons of Members of the Association of Commerce," Wednesday evening, December 27, in the Gold Room of the Congress Hotel. His subject was "The Romance of the Air." A number of small models were flown by members of the club who were present.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(a) BELL CRANKS FASTENED FIRMLY TO THE WINGS
(b) WINDING HANDLE.
(c) ELASTIC WHICH CAUSES DOWNSTROKES OF WINGS TO BE MORE POWERFUL THAN THE UPSTROKES
2
3

1 SIDE VIEW OF MECHANISM
2 PERSPECTIVE VIEW
3 THE COMPLETE MODEL

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

An Essay on the First Flight

Passed by the National Biscuit Co.

The first flight in the history of the world was made by a young chap named Icarus, if we believe the story books. From the spelling of his name it is quite evident that Icarus was a Roman. If, however, we give his name the phonetic pronunciation we find quite a different aspect on the matter. Pronouncing the syllables we would have somewhat the following:

I-care-us. Now from the knowledge of suffixes and prefixes drilled into us in school we are able to give each part of the name its meaning, and we arrive at quite a wonderful conclusion. *I* is the personal pronoun of the first person. *Care* means *worry*, or *strain*. The ending *us* or *ous* means *full of*. Hence a little stretch of imagination brings us to our definition of the name. I am fully of worry, or strain, hence "I should worry."

From this it is quite evident that the young man was reckless (until he fell for the first time) sort of a chap, and did not give a hoot for any personal danger. The facts of the case are these: Icarus,—we'll call him Ike for short, was a happily married man, living in great contentment at his villa or esplanade, or whatever they called it in those days, when his mother-in-law descended bag and baggage and settled her dominant personality upon the household. (Ike stood it for a while for there was a good prospect that she would settle some money on the household if she had a pleasant stay). However, the time wore on and all the dear lady settled was her personality and a few quarrels between the loving couple.

In those days it was not so easy to jump on a train and go off to the golf links, for the trouble was that there were neither golf links or trains existing. Ike happened to be looking at a ten dollar gold piece, and happened to notice that it was called an eagle.

"Why is a ten dollar gold piece called an eagle?" he asked a creditor who happened to be standing near with the county sheriff.

"Well Ike," said the sheriff, "I guess it's because you never see them in flocks." This hasn't anything to do with the story, but anyway it seems that Ike got some inspiration from gazing at the eagle, and decided that he too must fly. So he summoned a nearby Ethiopian and sent him out to procure a couple of eagles. The darkey could find no eagles, but returned with a few chickens. (The feathered variety, not the Broadway kind.)

Ike took the chickens to a seamstress and had her sew him a beautiful set of wings. The following we do not guarantee, it's in the legend.

The legend states that Icharus affixed the wings, and selecting a rainy day, decided that this was the time to escape from the mother-in-law.

Climbing the back stairs he emerged upon the roof, and stroking the left hind foot of a rabbit and throwing some salt over his shoulder for luck he flew off. After he had flown for a few hours he passed over a glue factory (or it may have been the factory of the Odor-Engine), and not being able to stand the fumes that came upward, he flew higher, neared the sun, which melted the wax in his wings, and falling precipitously he landed in a coal yard. However, it was soft coal and he was not hurt.

(Editor's note. The young man who wrote the above is now resting peacefully in a nice warm insane asylum, where he will not be mistreated).

Another Entry

Editor Aeronitis,

Dear Sir—I wish to enter the great aeroplane race announced in your paper November 20th, but before sending a check for $1,000 for any entrance fee would like to see the rules of the race, and a map of the course.

I presume that you are working secretly on the rules now and, if it is not too late, may I offer a couple of suggestions?

First.—If you could arrange to have the race start from the town where my aeroplane is being built and finish at the same place, it would be a great convenience to me: only I don't like to tell where that place is just yet, for fear it will bring a crowd of curious people around to see my machine. It's worth seeing, let me tell you, and hearing too. I forgot I must not tell you about that yet. Coming back to the suggestion; couldn't you mark a place on the map with an X until later for my town?

Second.—I would suggest that you make the North Pole one of the comtrolls. It would tend to freeze out competitors, and I wouldn't mind the cold as I spent a winter in Duluth.

The double-end reversible biplane described by Mr. I. M. Likely in your issue for December 11th is very interesting. It would be great for playing Aero Polo, but I doubt the advisability of entering a twelve-sided circuitous race in such a machine.

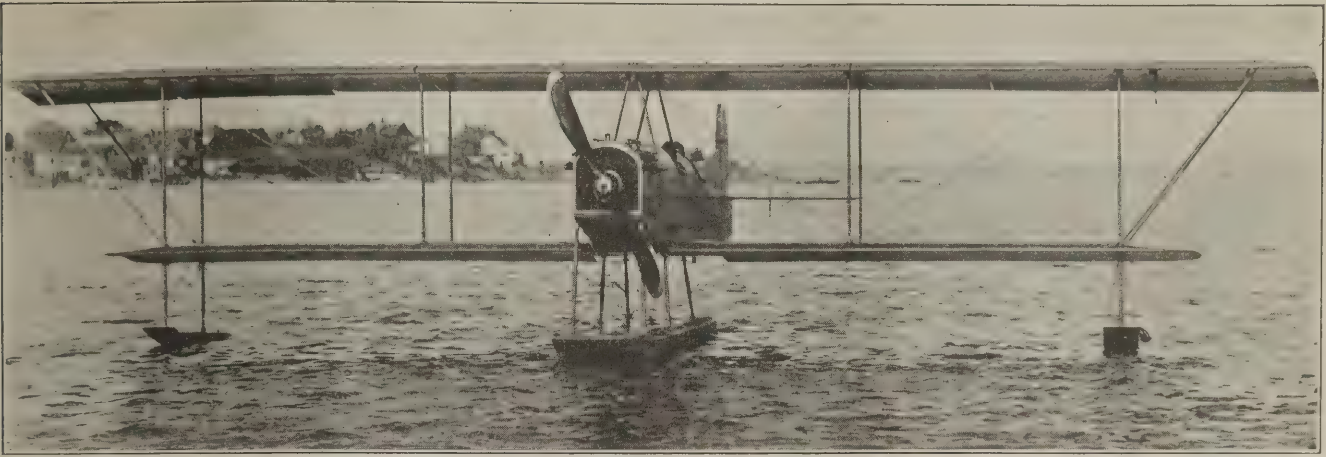
When Mr. Likely gets up near the North Pole and begins to get cold feet he is more likely to throw in the reverse lever and come back without finishing the race than he would be if it were less convenient to do so. When I go into the race I go in to win, and I prefer to burn the bridges behind me, metaphorically speaking, so that there will be no turning back.

As soon as you publish the rules of the race and a map of the course my check for $1,000 together with a description of my aeroplane, and a schedule of the time I expect to make in the race, will be forthcoming.

Yours confidently,
G. E. Whizz,
Per O. A. Danielson, Sec.

(For the present time at least, we must keep the details of our race secret, as we fear that foreign agents may steal our plans and interfere with the race. We will, however, give careful consideration to all suggestions, such as that of Mr. Whizz, and if we decide to have the North Pole as a stopping place, we will add to our list of prizes a two-by-four section of the finest whale-blubber.)

INSECTS.
"A Firefly."



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Among the many models of Airplanes, Seaplanes and Flying Boats produced by this company the new "U" type Hydroairplane meets a very pressing need—an efficient, well-balanced flying machine of conventional type and low power for militia training purposes.

The Massachusetts Naval Militia has the first one now in service.

Standard Deperdussin control in duplicate; Curtiss OXX-2 motor; simple float; light, sturdy construction; large speed range (forty to sixty-eight miles per hour); are characteristics necessary to the hard service required for training purposes.

Hydroplanes and pontoons designed and manufactured for airplanes of every type, including Curtiss, Sturtevant and other makers.

Designers and constructors for the U. S. Army and Navy and British Admiralty.

THE BURGESS COMPANY : : : MARBLEHEAD, MASS.

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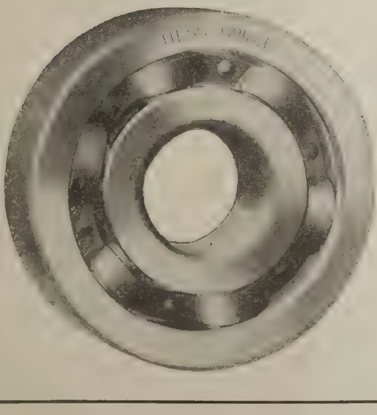

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(*Continued from page* 430)

WEDNESDAY, FEBRUARY 14th

Aeronautic Industry Day

Afternoon Session, 3:00 *P. M.*

Henry A. Wise Wood, President of the Society of Aeronautic Engineers, presiding. Speakers: Alan R. Hawley, President of the Aero Club of America, on "The Need of Building our Aeronautic Industry to Create Sources of Supply for Aircraft for National Defense." Lieut. Colonel George O. Squier, head of the Aviation Section of the Signal Corps, "What the Army is Doing and Planning to Do to Help the Developing of the Aeronautic Industry." Rear Admiral W. S. Benson, "What the Navy is Doing and Planning to Do to Help Develop the Aeronautic Industry." Charles Jerome Edwards, Vice-President Aero Club of America, "What the Aero Clubs Are Doing and Are Planning to Do to Develop the Aeronautic Industry." Henry Woodhouse on "The Prospects of Making the American Aeronautics Industry Self-Supporting Indefinitely of European Orders."

Evening Session, 8:00 *P. M.*

Howard E. Coffin, Member Naval Consulting Board, member National Advisory Committee on Aeronautics, presiding, will speak on the "Plans of the Council of National Defense to Co-ordinate All of the Aeronautics Resources for National Defense and on the Advisability of Aeroplane Manufacturers Agreeing on Some Co-operative Plan to Prevent Waste in Patent Litigation."

Alfred Reeves, Chairman of the Automobile Chamber of Commerce, will tell how the automobile manufacturers combined to avoid waste in patent litigation.

Messrs. Edward M. Hagar, President Wright-Martin Aircraft Corporation; Glenn H. Curtiss, President of the Curtiss Aeroplane & Motor Corporation; Harry Bowers Mingle, President of the Standard Aero Corporation; Benjamin S. Foss, Manager Aeronautic Department, B. F. Sturtevant Company; F. H. Russell, Manager Burgess Company; W. T. Thomas, President, Thimas Brothers Aeroplane Company; Inglis M. Uppercu, President, Aeromarine Plane & Motor Company; Albert H. Flint, V.-P., L-W-F Engineering Company, Edson F. Gallaudet, the Gallaudet Co., Tom W. Benoist, Benoist Aeroplane Co., and other aeroplane manufacturers will state their companies' wishes regarding the matter of forming a combination of manufacturers.

THURSDAY, FEBRUARY 15th

Aviators and Aerial Navigation Day

Afternoon Session, 3:00 *P. M.*

Rear Admiral Robert E. Peary, Chairman of the National Aerial Coast Patrol Commission, presiding.

Address by Captain B. D. Foulois, U. S. A., Victor Carlstrom and Miss Ruth Bancroft Law, J. Guy Gilpatric, Leonard W. Bonney, Philip A. Carroll, Capt. R. C. Bolling, and other noted aviators, on "Equipment Needed to Make Flying Easier."

Address by Captain Joseph E. Carberry, in charge Mineola U. S. Aviation School, on "The Ideal Aviation Field for Military Purposes."

Address by Lawrence B. Sperry on "Aeronautic Maps for Aviators."

Address by Capt. C. C. Culver, "Aero Radio Telegraph."

Evening Session, 8:00 *P. M.*

Dr. W. S. Stratton of the Bureau of Standards, Washington, D. C., who will deliver an opening address on "What Is Being Done by the National Advisory Committee on Aeronautics to Develop Safer Aeroplanes and Safety Devices." Dr. H. C. Frankenfield, Chief Forecaster, United States Weather Bureau, on "Forecasting for Aviators." Dr. E. Lester Jones, Superintendent U. S. Geodetic Coast Survey, on "Aeronautic Maps for Aviators."

Address by Captain P. F. Dodd, First Aero Squadron U. S. Army on, "Difficulties to be Met in Flying at the Mexican Border."

Special aeronautic films and slides will be shown daily, and other special meetings will be announced later. Also slides showing striking events at the war fronts, which will be shown by G. Douglas Wardrop, editor *Aerial Age.*

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FOR FLORIDA SEASON, PRACTICALLY new Flying Boat Factory overhauled, dep control or to suit buyer. Without motor $1400, with Curtiss O. X. $3000. Complete equipment and shipping crates. Apply Aerial Age, Box 104, 280 Madison Avenue, New York City.

INTERESTED IN AERONAUTICS? IF SO, why not join a progressive Club. Be associated with those who possess expert knowledge on the construction and flying of model aircraft and aviation in general. Write for information. Aero Science Club of America, Secretary, Engineers Building, 29 West 39th Street, New York City.

BUY YOUR MOTOR RIGHT. WE HAVE four used aero motors ranging from fourteen to eighty horsepower. Write for prices. Kemp Machine Works, Muncie, Indiana.

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One of the most comprehensive books dealing upon the subject of model aeroplanes and their motors. The book includes a short history, a complete description of a simple model, World's record Models, compressed air, steam and gasoline engines, models driven by such engines, world's records and a list of definitions of aeronautical words and terms. Price Net $1.00, Aerial Age, 280 Madison Avenue, New York City.

MODELS—MODEL AEROPLANES, ACCESSORIES and supplies. Material suitable for the construction of models that will FLY. Moderate prices. Prompt deliveries. Complete catalog free on request. Wading River Mfg. Co., Wading River N. Y.

WANTED: AEROPLANE DRAFTSMEN, metal workers, assemblers, state experience. The Thomas Bros. Aeroplane Co., Inc., Ithaca, N. Y.

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BOOKS FOR THE AERONAUTICAL STUDENT'S LIBRARY.

Principles of Aeroplane Construction by Rankin Kennedy	$1.50
Aerial Navigation by Dr. A. F. Zahm	3.00
Aero Engines by G. A. Burls	3.00

The Aeronautic Library, 280 Madison Ave., New York City.

TECHNICAL AND PRACTICAL EXPERIENCED airship builder on rigid dirigible types, with U. S. Patentlessee for hydro dirigible airship, interested by the Government, seeks connection with some reliable party to take up this matter. Box 108, Aerial Age, 280 Madison Avenue, New York City.

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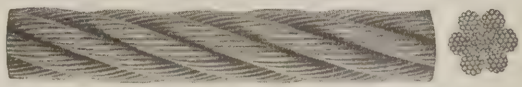

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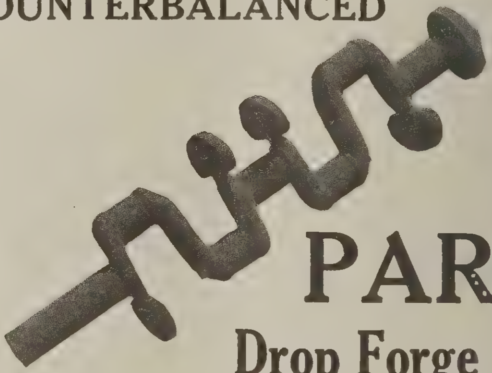

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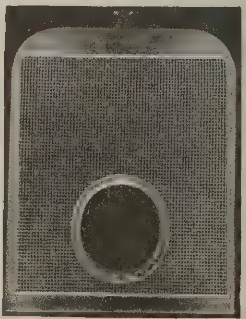

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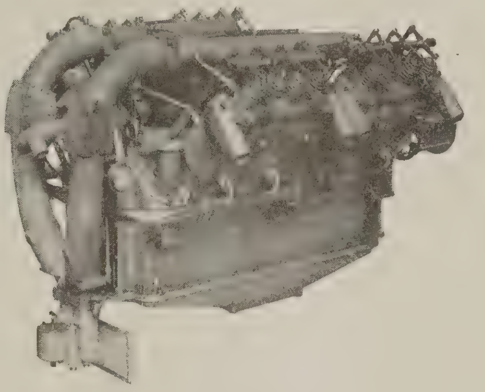

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AERIAL AGE WEEKLY

Vol. 4, No. 18 JANUARY 15, 1917 10 CENTS A COPY

Rear Admiral Peary Showing Us the Way to Attain Air Power Just as Rear Admiral Mahan Showed Us the Way to Attain Sea Power

General Ordnance Co's Aircraft Engine Described

Some Problems in Aeroplane Construction

How to Land an Aeroplane

By Lieut. H. A. Dargue

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Price $145.00 per thousand feet, f. o. b. New York. Inspection and acceptance New York.

For five hundred miles north of lower British Columbia the western coasts of Canada are bare of timber, but at the point where the Japanese Current strikes the coast line the spruce begins again. The trees are not as tall nor as great a diameter as the spruce of British Columbia, Washington and Oregon, but the trees are of sturdier growth and there are thirty per cent more grains to the inch. This lot is guaranteed to be the finest and strongest aeroplane timber to be found and this offering practically closes the market of this action.

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Price $155.00 per thousand feet. Terms: Confirmed bank credit at time of entering contract and cash against loading bills of lading. Freight allowed to Atlantic Seaboard.

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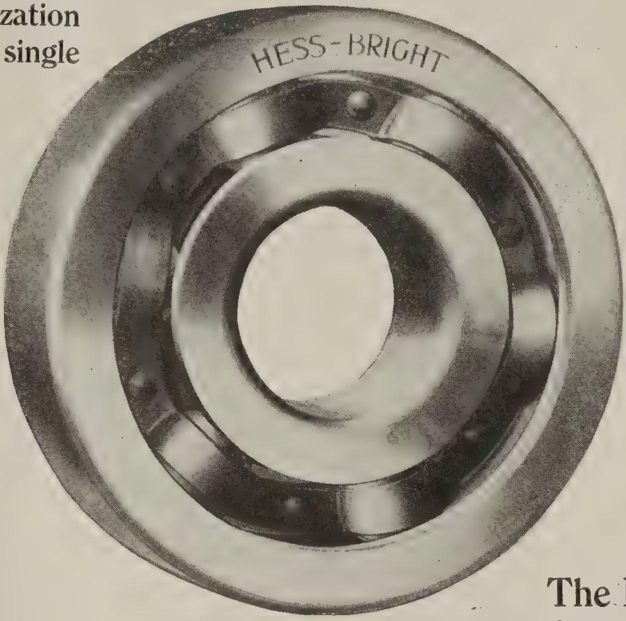

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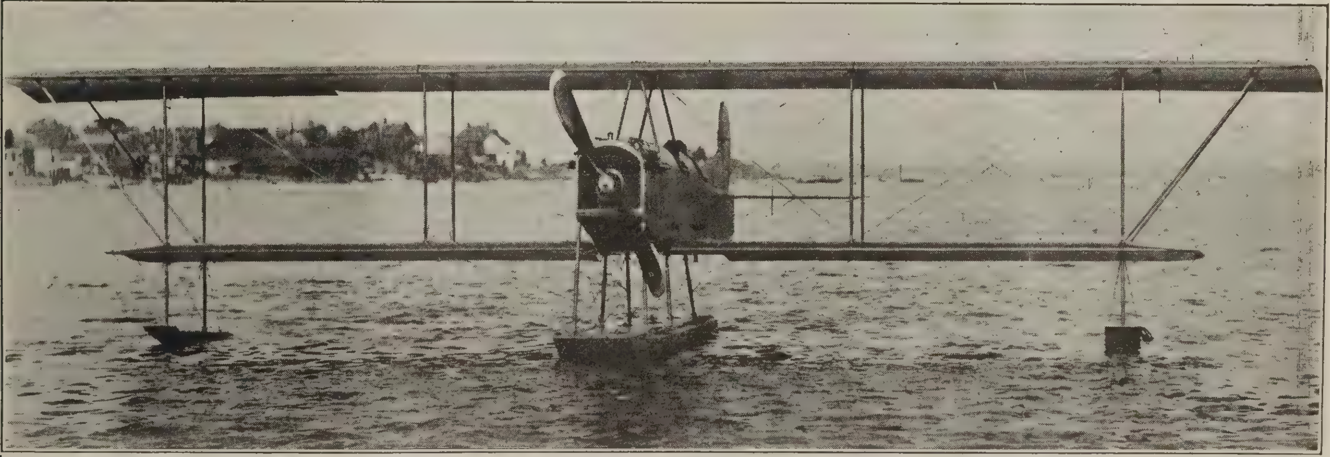

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AERIAL AGE WEEKLY

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FELIX PAWLOWSKI (Instructor in Aeronautics University of Michigan)
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VOL. IV NEW YORK, JANUARY 15, 1917 No. 18

REAR ADMIRAL PEARY SHOWING US THE WAY TO ATTAIN AIR POWER JUST AS REAR ADMIRAL MAHAN SHOWED US THE WAY TO ATTAIN SEA POWER

$20,000,000 Needed for Naval Aeronautics. Mr. Hawley Would Decline Secretaryship of Aeronautics

Recently the New York "Times" printed a short statement from Rear Admiral Peary on the Value of the Aerial Coast Patrol. A hasty gentleman criticized the statement and Mr. Alan R. Hawley, the very efficient president of the Aero Club of America, points out in the following letter how the critic is utterly wrong—and gives much valuable information regarding our naval defenses.

Surely, Mr. Edward F. Chandler, who criticizes Rear Admiral Peary's statements regarding the value of an efficient aerial coast patrol, has not read the Admiral's many articles to the *Times* dealing with the vital need of fast battle cruisers, submarines and anti-aircraft defenses, else he would not criticize the Admiral's brief statement regarding the need of the aerial coast patrol.

Therefore his criticism is purely of what he did not read, and lack of knowledge of the fact that the article which he criticizes is only an excerpt of a most valuable plan for national defense.

Rear Admiral Peary is one of the few men in the United States who stand for real preparedness and have vision. There are others who also stand for real preparedness but lack vision; therefore they are unable to point the way to solve problems which require a number of years to solve.

Peary Showing Us the Way to Attain Air Power As Mahan Showed Us the Way to Attain Sea Power

When Sir Percy Scott, in 1914, prophesied that submarines and aircraft would be powerful factors in the next war, they scoffed at him—as they scoffed at those who foresaw the advent of the trans-Atlantic submarine.

Rear Admiral Peary is speaking to the nation in terms of **Air Power,** that is, command of the air by overwhelming number and efficient types of aircraft and aviators, and points out the way of attaining it and as a means of making up for our inability to make any great advance as a naval power. **He speaks to us in terms of thousands of aircraft —aeroplanes, dirigibles and kite balloons—taking into consideration that the development of aircraft will continue to be at least as fast as it has been in the past.** He expects the enemy to have aircraft, but expects and urges us to have more than the enemy have.

His statements are based on actual knowledge of daily happenings in the present war and knowledge of the fundamental values of new weapons such as aircraft and clear understanding of possibilities. **He is doing for this country in showing us the way to attain command of the air as much as Admiral Mahan did in showing us the way to attain command of the sea.**

It may be quite true that "an aeroplane would not have been able to detect the approach of the U-53 nine times out of ten, because of weather conditions," as Mr. Chandler states, but nor could a ship, and the submarine's action would be very much limited by those same conditions.

Great Britain Has 107 Aeronautic Stations—U. S. Navy Has Only One Station

The last reliable report gave Great Britain 107 aeronautic stations. Seaplanes and dirigibles which have their bases on shore are used for bombing submarine and aeronautic bases, protecting ships and the coasts against submarines, holding up and convoying ships, and fighting other aircraft. This is exclusive of their work in connection with the fleets. They keep the coasts fairly clear of U-boats and the sky fairly clear of aircraft. They are doing the work that the Aerial Coast Patrol would do in time of war.

How badly the Aerial Coast Patrol is needed can be seen in the statement of Captain J. S. McKean, in charge of aviation in the Navy, to the House Committee on Naval Affairs. Captain McKean gives the aeronautic equipment of the United States Navy as consisting of twelve aeroplanes, two balloons and a training dirigible at the Navy's only aeronautic station, Pensacola, Florida; thirty training aeroplanes ordered, two aeroplanes on board the *North Carolina,* five aeroplanes at Portsmouth, N. H., awaiting to go on board of the *Washington;* one kite balloon on board of each of the *Nevada* and the *Oklahoma.*

This is all the aeronautic equipment that our first line of defense would have with which to meet an emergency! And the present estimates for naval aeronautics aim to provide only thirty aeroplanes for the fleet; four aeroplanes and two kite balloons for the Marine Corps; forty aeroplanes for the Pensacola station, and two large dirigibles. Provision is made for establishing an aero station on the Pacific Coast and one at Pearl Harbor, but no funds are asked for aircraft for same.

Captain Mark L. Bristol, when he appeared before the House Committee on Naval Affairs on February 21st, 1916, stated that the fleet needed then eighty-two aeroplanes, five dirigibles and forty-one kite balloons and that the fifteen naval shore stations needed 120 aeroplanes, fifteen dirigibles and forty-one kite balloons. He estimated the cost of this equipment at $20,000,000. The Navy Department, however, only asked for $2,000,000, which Congress increased to $3,500,000. This year the Department asks only $5,130,000.

As the need has not decreased since last year it is to be hoped that Congress will appropriate the $20,000,000 needed, so that steps can immediately be taken to establish fifteen naval aeronautic stations. **England has 107 stations, Germany and France over 100 each. Our Navy has only one station!**

The great problem has been the shortage of officers in the Navy to develop the air service. This problem is recognized by the Navy Department and an effort is being made to make up the deficiencies in personnel by forming reserves. **It is now hoped that the Universal Training measure will be passed by this Congress,** which would solve the problem permanently.

But whether the Aerial Coast Patrol duties are to be performed by regulars or reserves, it has an important mission and no time should be lost in organizing it.

What Peary Means by Command of the Air

What Rear Admiral Peary means by "Command of the Air" can best be explained by the following quotations from a manuscript which the Admiral presented to us several weeks ago, which shows how close the Admiral follows European events. He culled the following expressions himself from discussions of the subject which took place in Parliament during the past year. To quote from his manuscript:

Mr. Balfour on the floor of the House of Commons said:

"The time is here when command of the sea will be of no value to Great Britain without corresponding command of the air."

Lord Charles Beresford on the floor of the House of Lords:

"The time is here when the air service of Great Britain will be more vital for her safety than her Army and her Navy combined."

Colonel Winston Churchill, formerly First Lord of the Admiralty:

"Ultimately, and the sooner the better, the air service should be one unified permanent branch of imperial defense, composed exclusively of men who will not think of themselves as soldiers, sailors and individuals, but as airmen and servants of an arm which possibly at no distant date may be the dominating arm of war."

Lord Montagu of Beaulieu:

"Every nation will before long be forced to create an Air Ministry by the sheer necessity which knows no law, which regards no precedent, and which fears no Government. The immense development of aircraft in all directions alone will compel the creation of an air department."

General Petain, one of the defenders of Verdun, on the floor of the Chamber of Deputies:

"I see France in the near future with 50,000 aeroplanes."

Lord Montagu, of Beaulieu, in the House of Lords, March 9, said:

"At the present time the air service is merely auxiliary to the fighting forces of the Navy and Army. I can see a time coming when the air service will be more important than the Army and Navy. We must get into the habit of looking at the air service not as an auxiliary to the Army and Navy, but as a great service which is an establishment of itself, and to which we shall have to look in future years for the defense of this country. The advantages of our insularity are rapidly disappearing. Upon the efficiency of the air service much will depend. Let it not be said with shame of our generation, that we did not trouble to guard in the air what our forefathers won on the sea."

Lord Beresford said:

"The new air warfare is going to be of so tremendous a character that it may supercede the Army and Navy. We should be ahead in the air, the same as we are on the water."

Lord Montagu, of Beaulieu, guest of the Liberal War Committee, at a luncheon at the House of Commons, March 23rd, said, among other things:

"The struggle for supremacy in the air is only just beginning, and will not stop when peace comes. Compared with the cost of dreadnaughts, field guns and armies in the field, the cost of even a huge aerial fleet would be small. What is wanted now in our statesmen and in our nation is more power of imagination. They can neither win nor hold an Empire merely by safe policies. Safe men are all very well for times of peace. But time comes when they may be dangerous. What we want now is new men with new ideas. The problems of the air are all new. There are no precedents to bear in mind. No files to refer to, no historical works to consult. The new service will need leaders who have ideals, foresight, imagination and scientific training. These leaders must always have a clear vision of future possibilities, most of which are probabilities."

Aerial Coast Patrol Appropriation Should be Made Available

Those of us who know how few people there are interested in real preparedness, who also have vision wish that we had more men of Rear Admiral Peary's calibre.

Bills authorizing the Aerial Coast Patrol have been introduced in both Houses. They appropriate $1,500,000 for establishing this valuable system of training civilian reserves for aerial coast defense, co-ordinating the efforts and resources of civilians interested in aeronautics under the control of the Navy. The work of the Aerial Coast Patrol Unit No. 1 has proven its value. It is a good economic measure, and should be put into effect.

Likewise Mr. Chandler does not understand that the proposal to establish a Department of Aeronautics, with a Secretary of Aeronautics, is intended to co-ordinate all the aeronautic resources for national defense. Great Britain has just taken such a step by extending the power of the Air Board, placing both the Royal Naval Air Service and the Royal Flying Corps under its jurisdiction and placing one of the best civilian organizers in charge, Baron Cowdray.

Would Decline Office of Secretary of Aeronautics

Lest my interest in the Department of Aeronautics and the Secretary of Aeronautics be misunderstood, I will repeat what I stated in the spring, 1915, when I endorsed the plan for a Department of Aeronautics and Secretary of Aeronautics, that **I positively would not accept that or any other office if it were offered to me.** But I will continue to make every effort to develop our aerial defenses. We are very backward in this important branch of both services. **We have not yet two hundred military aviators trained or under training in both services, while half a dozen other countries have between 2,000 and 10,000 aviators each.**

Yours very truly,

ALAN R. HAWLEY,

President, Aero Club of America.

The Pan-American Aeronautic Exposition

(From the New York Herald)

That the Aero show has in store much that is novel, is quite evident. Aeroplanes not only capable of carrying several passengers, but capable of carrying many tons of cargo, are to be exhibited. In an address to members of the Rotary Club, Henry Woodhouse, of the Board of Governors of the Aero Club of America, who is devoting his entire energies to the success of the forthcoming show, made some statements that greatly surprised his hearers.

"The largest aeroplane," said Mr. Woodhouse, "has a carrying capacity of fifteen tons. Plans are ready for an aeroplane of twice that size, capable of lifting thirty tons."

This was startling news to many, and when they heard Mr. Woodhouse tell how there are 25,000 aeroplanes in use in the world, they blinked. The reason there are not more aeroplanes, declared the speaker, is that the European nations cannot get them fast enough to replace those that are put out of action or worn out daily.

"American aeroplanes and motors are equal to the best," continued Mr. Woodhouse. "Victor Carlstrom, who flew from Chicago to New York and from New York to Washington, told me the other day that the efficiency of American motors and American aeroplanes is such that anything is possible. It is only a question of making an itinerary and carrying it out. A flight of more than 1,000 miles in one day is possible.

"The one important development that has taken place which has changed the aspect of things to aeronautics is that the motor has been so improved that it can now outlast the aviator. Heretofore, since 1910, the aviator always outlasted the motors. Before that, men knew little of the requirements of flight, and the motor, although rather inefficient, outlasted the man, who was, however, not yet an aviator.

"Now that the motor is efficient and oulasts the aviator, aeroplanes equipped with from two to six aeroplane motors carrying up to thirty persons, can be built and employed for commercial purposes. A trans-Atlantic airline is quite possible.

"Great Britain is spending $250,000,000 in military aeronautics this year. Five hundred thousand people are working, producing and operating air craft and aeronautical supplies. The American aeronautic industry has and is about to get orders amounting to $50,000,000.

"A half dozen countries have between two thousand and ten thousand aviators. The United States army and navy together have only about one hundred. The European countries have thousands of observation balloons and hundreds of dirigibles. The United States army any navy together have only four observation balloons ordered and one small dirigible."

About ten thousand delegates representing every country in the world, the United States Senate and House of Representatives, the different branches of the army, navy, militia, coast guard, Post Office, &c., the forty-eight States, 500 cities, 1,000 scientific, national defence, educational and civic organizations interested in Pan-American matters and aeronautics are expected to attend. Indeed the Aero Exposition is to be the most far reaching event which has been held anywhere or in connection with any line of human endeavor.

THE NEWS OF THE WEEK

Equipment of Hampton Roads Army Aviation Field

Authority having been given by the Secretary of War for the purchase of a tract of 1,650 acres of land at Hampton, Va., at a cost of $290,000, out of an available appropriation of $300,000, for use as an experimental and proving ground for the aviation service of the army, attention now is being given to equipment of the establishment which, it is estimated, will require an initial expenditure of about $1,500,000. The purpose of the plant will be as follows:

Testing aeroplanes made by manufacturers throughout the country for climb, speed range, controlability, stability, &c., and correcting faults and weaknesses in such aeroplanes brought out by tests, and generally developing and improving them.

Testing aeroplane motors on a stand for power, endurance, reliability, fuel economy, &c., and correcting defects brought out by tests.

Testing aeroplane motors in flight, mounted in standard or experimental aeroplanes, for ascertaining general suitability and correcting faults developed.

Developing inventions pertaining to aviation when inventors cannot afford to do so.

Testing in flight instruments and accessories pertaining to aviation.

Making (from designs of full-scale aeroplanes) exact models and testing them in the wind-tunnel for aerodynamic coefficients, resistance derivatives and rotary resistance derivators, from which the degrees of symmetric and assymetric stability may be calculated.

Designing, building, testing and developing radio equipments for aeroplanes.

Designing, building, testing and developing machine-gun mounts, bomb-dropping devices, &c., for aircraft, it being planned to detail an officer of the ordnance department to assist in this work.

Testing balloons and correcting their faults and weaknesses.

Instucting and training inspectors to reside at factories where aviation equipment for army is being built.

The experimental and inspection department will include an intelligence bureau, whose function would be to obtain from our military attaches abroad and from foreign periodicals the reports of progress in the science of flight abroad, and to translate, file and index such reports for reference.

Army and Navy News

Sergt. Edward G. Schultz, Signal Enlisted Reserve Corps, to active duty in Aviation Section, Signal Enlisted Reserve Corps, with station at the Curtiss Aviation School, Newport News, Va. (Dec. 29, War D.)

Sergt. St. Clair Street, Signal Enlisted Reserve Corps, now at Fort Monroe, Va., to active duty in Aviation Section, Signal Enlisted Reserve Corps, and will be sent to the Curtiss Aviation School, Newport News, Va., for station. (Dec. 29, War D.)

The following sergeants of the Signal Enlisted Reserve Corps are assigned to active duty in the Aviation Section, Signal Enlisted Reserve Corps, with station at the Aviation School, Memphis, Tenn., Jan. 1, 1917: Albert C. Adams, Joseph Van Walchshauser, Austin E. Gibson, Charles W. Browne, George J. Kinberg, George W. Sawyer, Rudolph W. Schroeder, William A. Thompson, Michael L. Gerlowski and Victor J. Picard. (Dec. 30, War D.)

Capt. John O. Steger, Q. M. C., from Southern Dept. to Hampton, Va., and assume charge of construction work pertaining to aviation experiment station.

First Lt. John D. Von Holtzendorff, field artillery detached list, from duty with aviation section, Signal Corps, to duty with 8th Field Art., at Ft. Bliss.

First Lt. John C. Walker, Jr., inf. detached list, from duty with aviation section, Signal Corps; to duty with 35th Inf. at Douglas, Ariz.

Besides Robert Glendenning, of Philadelphia, who is an expert aviator and has just returned from France, where he visited aviation commands, the army is obtaining a number of men for the aviation section of the signal officers' reserve corps that are prominent in business and engineering circles and that are interested in aeronautics for the reason that they desire to aid the development of military aviation, Among the recent accessions of this class are Sidney D. Waldon, formerly connected in an engineering capacity with several well known motor vehicle manufacturing companies, and William H. H. Hutton, who also has been prominent in the motor vehicle industry, who will be commissioned captains in the reserve and assigned to active duty.

Regulations prescribing uniform apparel for army aviators soon will be issued to the service.

Capt. Thomas S. Bowen, aviation officer, signal corps, has been selected to command the third aero squadron being organized at San Antonio, Texas. The fourth squadron, which will be organized at the same place, has not had its commander assigned to it as yet. These squadrons will be equipped with machines adapted for flying over land.

Two other aero squadrons are to be organized within the next few months, one for duty in the canal zone and the other for duty in the Hawaiian Islands. Capt. Henry H. Arnold, aviation officer, signal corps, will be assigned to command of the Panama squadron, and Capt. John F. Curry, aviation officer, signal corps, to command of the Hawaiian squadron. The commands will be organized and outfitted at their stations and they will be equipped with hydroaeroplanes.

The army aviation school at Chicago will be moved to Memphis, Tenn., and that at Mineola, N. Y., to Aiken, S. C., for remaining winter months.

Maj. James P. Harbeson, Twenty-first infantry, has been selected to take the next course of instruction for field officers at the signal corps aviation school at San Diego, Cal.

Export of Aeroplanes

Since our last report the export of aeroplanes and parts has been as follows: To the Netherlands, $3.071; to Russia, $52,000; to Colombia, $9; to Norway, $5,000; to Great Britain, $17,000; to Venezuela, $125; total, $77,205.00.

Vincent Astor Gets Ready for War Duty

Vincent Astor is now enrolled as a student at Uttmark's Nautical Academy to prepare himself to take the commission of ensign in the navy in case of war. He has been at the school for a month and is being instructed in the principles of navigation and nautical astronomy.

Mr. Astor's studies at the school are the result of his intense interest in preparedness and were undertaken to make him more proficient as a member of the Volunteer Patrol Squadron, a fleet of power boats available for scout duty in case of war. In addition to his preparedness activities at the Uttmark school and with the patrol, Mr. Astor is a member of the aeronautical corps of the 2d Naval Reserve Battalion. He has been instructed in the operation of hydroaeroplanes by Clifford Webster.

Wisconsin Motor to Give Employees Bonus

The management of the Wisconsin Motor Co. have just decided to establish a plan of extra payments to all employees working shop hours on an hourly basis or on piece or premium rates, during 1917.

The plan takes into consideration the fact that continuous service increases the value of the employee to the company. The following is the announcement by the company:

"Such employees as above set forth, on the pay rolls as of January first, 1917, who continue in the employment of the company during the year, will receive an extra payment of ten per cent (10%) on their total earnings for the year, distributed as follows:

"Two and one-half per cent (2½%), of the earnings for the first quarter, payable at the end of that period.

"Five per cent (5%), of the earnings for the first six months (less sum previously distributed), payable at the end of that period.

"Seven and one-half per cent (7½%), of the earnings for first nine months (less sums previously distributed), payable at the end of that period.

"Ten per cent (10%), of the earnings for the year 1917 (less sums previously distributed), payable at the close of the year.

"The percentages herein set forth are calculated upon the total actual earnings of the employee during the periods indicated and are not based upon the hourly rate.

"The plan will continue in effect for one year from January 1st, 1917."

Herbert Chase Assistant Secretary S. A. E.

Herbert Chase, who has been connected with the Automobile Club for the past eight years, has just resigned to become Assistant Secretary of the Society of Automobile Engineers.

In 1913 Mr. Chase was made chief Engineer of the club, and was placed in charge of the repair departments and equipment maintenance department in addition to the testing laboratory, In this capacity he continued the development of the testing laboratory and has, with the able asistance of W. A. Rue, broadened the service of the repair departments. Mr. Chase rendered signal service in planning for and equipping the club's East 72d street garage.

The U. S. Army Aviators and Instructors Who Flew From Mineola, Long Island to Philadelphia on December 30. The Group Comprises: Capt. Joseph E. Carberry, Lieut. W. G. Kilner, Capt. R. C. Bolling, J. B. Stetson, Jr., Lieut. J. E. Miller, Corporal H. H. Salmon, Sergeant E. W. Noyes, Lieut. N. Carolin, G. Osborn, E. W. Bagnell, A. M. Coyle, H. W. Blakeley, P. C. Millman, Leonard W. Bonney and Sergeant E. A. Krauss.

RETIREMENT OF GENERAL SCRIVEN, U. S. A.

Upon his own application after over forty-two years of distinguished service, Brig. Gen. George P. Scriven, U. S. A., Chief Signal Officer of the Army, will be placed on the retired list Feb. 14, 1917. In his letter to Secretary of War Baker requesting retirement, General Scriven said:

"I have served on active duty for more than forty-two years, in the United States, the Philippine Islands, Cuba, Mexico, Guatemala, Salvador, Nicaragua, Costa Rica, Italy, Turkey, Russia and in China, during the Boxer troubles, and although I deeply regret leaving active service I believe that my work is done."

General Scriven was born in Pennsylvania Feb. 21, 1854. He was graduated from the U. S. M. A. and promoted in the Army second lieutenant, 8th Infantry, June 14, 1878. He was transferred to the 3d Artillery in June, 1879, and remained in that command until December, 1890, when he was appointed first lieutenant in the Signal Corps. He had previously made an extended journey through Mexico, to gain a knowledge of its country and people, and it was on account of his most able reconnaissance work on this trip, that he was appointed in the Signal Corps. He reached the grade of lieutenant colonel in July, 1904. During his varied service he was among other duties at the U. S. M. A. as assistant professor of French, was on duty in Guatemala, Salvador, Nicaragua and Costa Rica, under U. S. State Department, as Commissioner of Columbia Exposition, 1891-92. He was appointed military attaché to Mexico, 1893, and to Italy in October, 1894. He was with the U. S. Commission at the coronation of the Emperor of Russia, in 1896, and was military attaché to Turkey and observer with the Turkish army, May-July, 1897.

General Scriven was appointed major and signal officer of Volunteers in May, 1898, and was assigned to the staff of Major Gen. Wesley Merritt in his expedition to the Philippines. He was later military secretary to General Merritt when the latter was military governor of the Philippines. He was Signal Officer, Department of Cuba, and military secretary to the major general commanding in 1899. In October, 1899, he was ordered to duty again in the Philippines at his own request. He took part in the famous China relief expedition, in 1900, under General Chaffee and was its chief signal officer, and was recommended for the brevet of lieutenant colonel by General Chaffee for gallant conduct at Yangstun, Aug. 6, 1900, and at Pekin, China, Aug. 14 and 15, 1900. After serving in the Philippines he was assigned to duty at Washington, and was acting chief signal officer of the Army at various intervals, and was on other duties, and then went to the Philippines again in 1909 as chief signal officer. His last assignment to duty was in Washington, D. C.

As Chief Signal Officer, Department of the East, from Dec. 14, 1904, to April 16, 1909, his duties were chiefly connected with the fire-control installations of the Coast Artillery forts from Maine to the Capes of Virginia. Colonel Scriven has received the gold medal of the United Service Institution, for an essay on "The Nicaraguan Canal in its Military Aspects," republished by authority of the Senate of the United States; has written on the Panama Canal, also a book published in 1908 by authority of the Signal Office, War Department, "The Transmission of Military Information." General Scriven was appointed Chief Signal Officer of the Army in February, 1913, by President Taft, and succeeded Brig. Gen. James Allen on the latter's retirement for age. General Scriven received very high official endorsements as to his ability from Generals Allen, Duvall, Chaffee, and others. Before entering West Point, General Scriven entered the University of Chicago and passed through the freshman year. He then left to study the profession of civil engineer at the Rensselaer Polytechnic Institute at Troy, N. Y., and passed through the first two years of the course at that institution, leaving to go to West Point.

When on a visit to the Mexican border last November, General Scriven journeyed by aeroplane from Columbus, N. M., to Colonia Dublan, Mexico, on an inspection trip to the American punitive expedition. He was the first general officer to make the trip through the air.

The trip of more than one hundred miles was made in about two hours.

The list of probable successors to General Scriven includes only four officers—Lieut. Cols. William A. Glassford, George O. Squier, Edgar Russell and Charles McK. Salzman. In view of the fact that Colonel Glassford will reach the statutory age for retirement on April 11, 1917, within a few weeks of General Scriven's retirement, the list is narrowed down to three names, with Colonel Squier, senior officer, holding the best chances for selection, it is thought.

Brigadier-General George P. Scriven, Who Retires February 14.

San Diego Activities

Six Curtiss military reconnaissance aeroplanes arrived at San Diego December 7 from Buffalo. The total number of seaplanes and aeroplanes now available for flight duty at the Army Aeronautical Academy at North Island, is twenty-seven, the greatest number in the history of the school. Thirty-seven student aviators are going aloft daily, while eleven are awaiting orders from the War Department to begin flight instructions.

The aeroplanes and seaplanes include practically every type of air craft manufactured in America, and all have been equipped with single and double controls. Lieutenant Herbert Dargue, chief instructor of flying, is arranging to send twenty aeroplanes, piloted by student aviators, taking their tests for the rank of junior military aviator, on a flight from San Diego to Los Angeles, about February 1.

The flotilla will be accompanied by two aeroplanes equipped with wireless instruments, making a total of twenty-two machines aloft simultaneously; the greatest number in the history of American aeronautics.

Colonel William Glassford, commandant of the Army Aeronautical Academy, announced that during 1916, student aviators at North Island made 7,125 flights for a total time aloft of 3,373 hours, thirty-six minutes. The total distance covered in these flights was approximately 206,750 miles.

"We made wonderful strides along military aeronautical lines last year," said Colonel Glassford. "We are going to continue the good work in 1917 and in succeeding years.

"Hangars are being constructed to house fifty machines, the flying field is being cleaned to permit forty aeroplanes to ascend or alight simultaneously and the equipment of the laboratories, repair and assembling departments increased.

"Every skilled aviator that can be spared from other duties is being pressed into service for instruction flying duty. Before many more weeks, when we will have more than seventy triplanes, reconnaissance pursuit and seaplanes on hand and we expect to have more than fifty machines aloft daily with student aviators."

The Junior Military Aviation class that will graduate from North Island next month will be the largest in the history of the school. The graduates will be sent, it is expected, to Hawaii and Panama to form a nucleus for the fourth and fifth aero squadron.

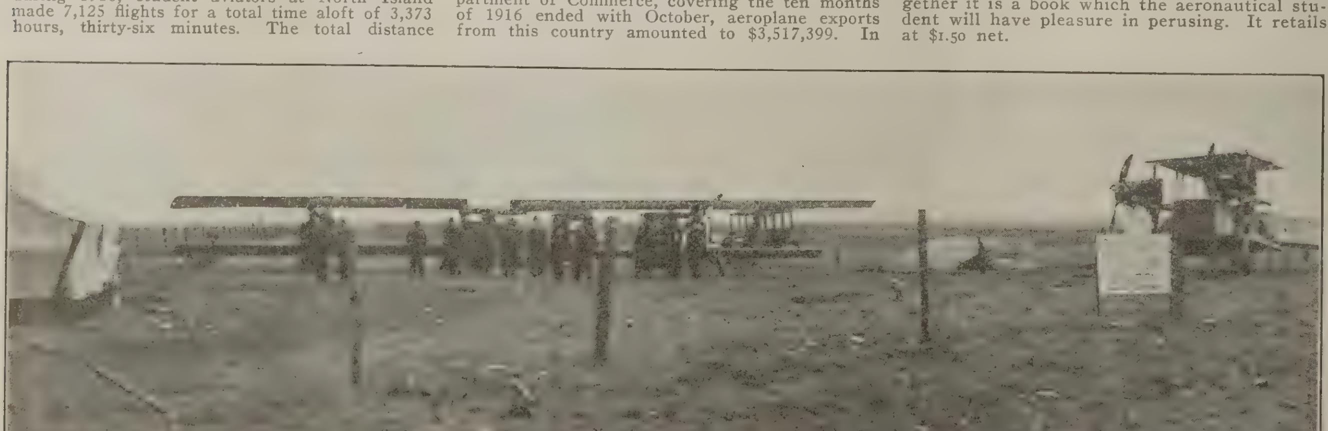
Aeroplane Exports During 1916

Based upon the official statistics of the Department of Commerce, covering the ten months of 1916 ended with October, aeroplane exports from this country amounted to $3,517,399. In the ten months of 1914 the shipments had a value of only $214,057. It was estimated yesterday that the total exports of heavier-than-air machines in the entire twelve months of 1916 would approximate $4,317,399.

England has been the best customer of American aeroplane manufacturers, although the Government statistics failed to show the distributions of the machines by countries. Details covering exports of aeroplanes reveal that Russia, Italy, Portugal, and presumably France, of the Entente Allies, were liberal buyers in 1916 of flying machines.

"Aircraft of Today"

Charles C. Turner, aviator, aeronaut and lieutenant of the R. N. V. R. of Great Britain, is one of the best known writers in England on aeronautical subjects, and we welcome his latest book, "Aircraft of Today," which has just come from the press of J. B. Lippincott Company. While the book must of course deal only in a general way with the recent developments in England, on account of the censorship, it shows the immense importance placed by all the authorities on the air services. The diagrams, which are numerous, and illustrations are well chosen, and altogether it is a book which the aeronautical student will have pleasure in perusing. It retails at $1.50 net.



The Sunnyvale Aviation School, California. The Site for the Army Aviation base in Santa Clara County, San Francisco Bay, lies in the Rear of the Aeroplanes.

GENERAL ORDNANCE CO'S TYPE L. M. 200 H. P. AIRCRAFT ENGINE

THE General Ordnance Co., has just completed a powerful motor for aeronautical purposes, the general specifications of which are given below. Although rated at 200 H.P., it is claimed to actually develop 250 H.P. at 1800 r.p.m.

The drive to propeller is by reduction gear, by ratio determined by conditions of each individual case. In the present motor the ratio of reduction is 2 to 1.

Cylinders

Eight cylinders are arranged V fashion, cast in pairs of Lynite, surrounded by water jacket.

Bore, 4.75 in.;. stroke, 6.5 in. Piston displacement per cylinder, 115 cu. in. Total displacement per motor, 920 cu. in.

Each piston weighs 2.97 lbs., with rings and pin. Length 6¼ in., with two Gill concentric single type piston rings. Width, 5/16 in.

Connecting rod, forked, with bearings, weighs 5.841 lbs. The plain rod weighs 3.4 lbs. Length, centre-to-centre, 13.25 in.

Bearings

Piston pin bearings are of Lynite, with no bushing. Diameter, 2⅝ in.; length 3⅝ in.

Crank bearing of babbit, bronze faced, same diameter and length as piston pin bearings.

Main bearings, three in all, 3⅞, 4⅝ and 5½ inches long. Diameter, 2⅜ in. All of babbit, bronze lined.

Valves

Overhead valves of the poppet type, in a single row over the cylinders all completely covered in.

Inlet valve, outside diameter, 2¾ in.; inside diameter of seat 2-7/16; lift, ⅝ in.

Exhaust valve, outside diameter, 2-1/16 in.; inside diameter of seat 1¾ in.; lift, ⅝ in.

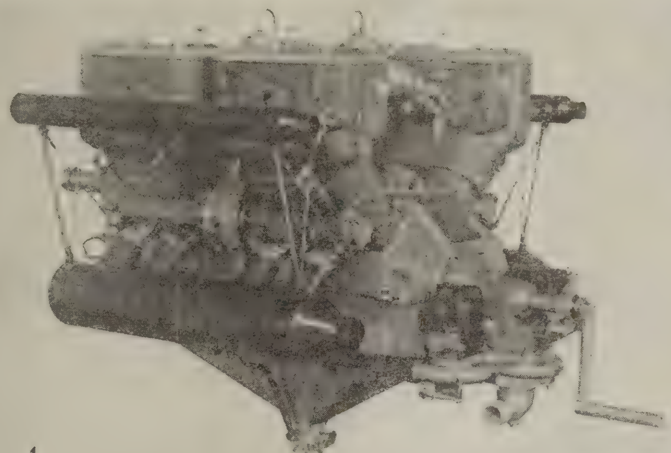
Auxiliary over-run exhaust ports at bottom of stroke controlled by rotary valve at one-quarter engine speed. Area of openings, 2.12 sq. ft.

Carburetion

Zenith O8D carburetor with a 2-inch opening. The manifold is water-jacketed and heated by hot air.

Cylinders on each side are served by a separate jet manifold, completely waterjacketed.

(Continued on page 466)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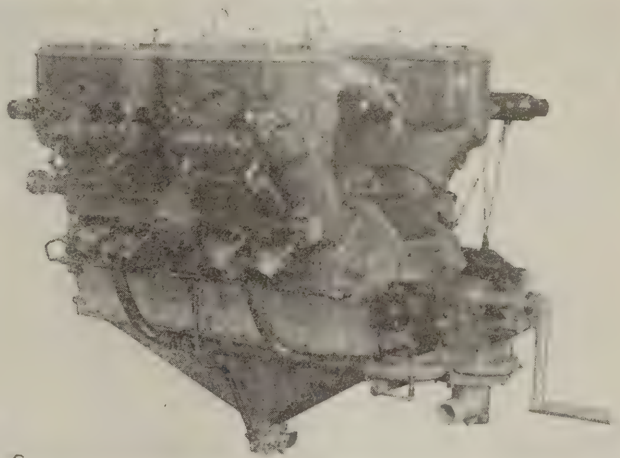
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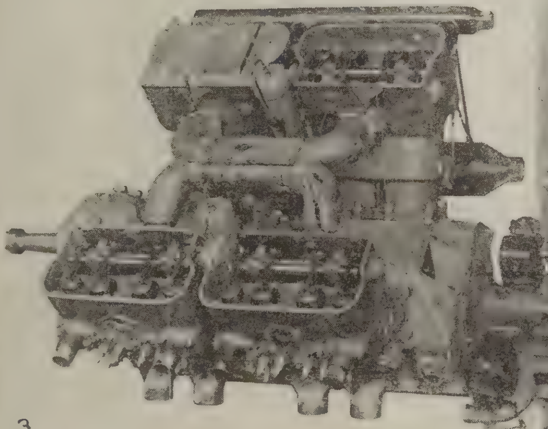
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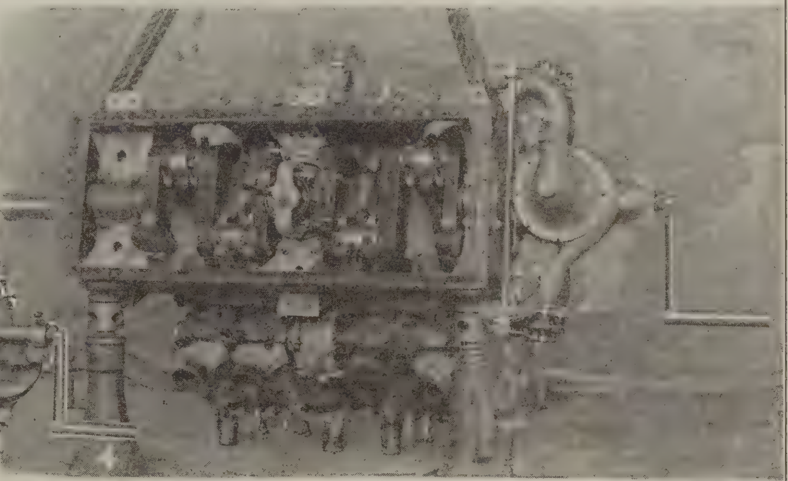

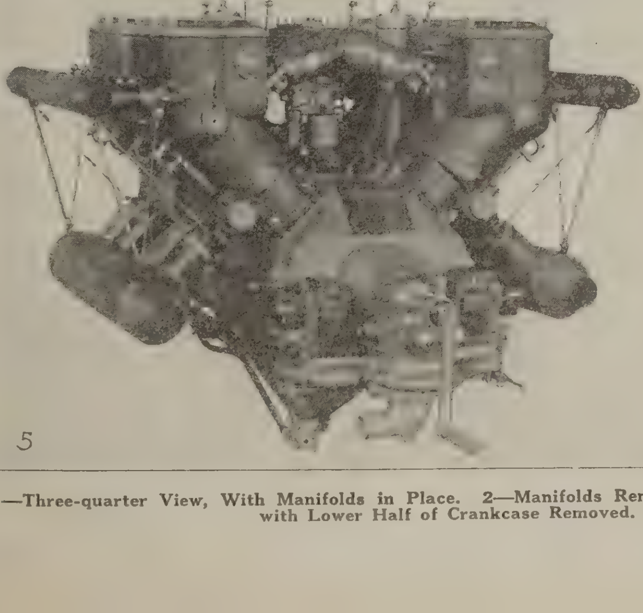
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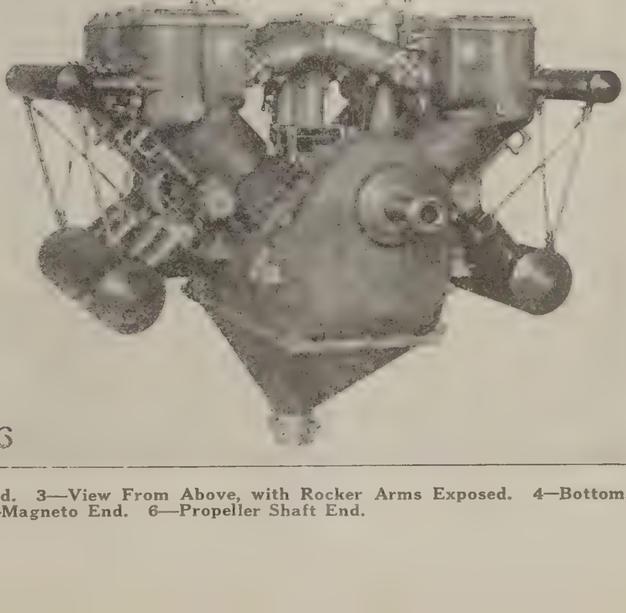
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1—Three-quarter View, With Manifolds in Place. 2—Manifolds Removed. 3—View From Above, with Rocker Arms Exposed. 4—Bottom, with Lower Half of Crankcase Removed. 5—Magneto End. 6—Propeller Shaft End.

SOME PROBLEMS IN AEROPLANE CONSTRUCTION

By Capt. V. E. Clark, Chief Aeronautic Engineer, U. S. Army; Capt. T. F. Dodd, Signal Corps, U. S. Army; and D. E. Strahlmann, Engineer, War Department, Office of the Chief Signal Officer

[*The following paper was prepared by the authors for presentation at the annual meeting of the Society of Automobile Engineers, held on January* 11*th, in New York, and covers important problems in the construction of aeroplanes for military use in this country. It is reprinted herewith through the courtesy of the S. A. E. Bulletin. Editor.*]

IN this paper we shall advance for discussion, with hopes of solution, some important problems connected with the construction of aeroplanes intended for military uses in the United States. Many of these problems also apply to aeroplanes built for commercial and sporting purposes. Although the lessons on type development that are being learned in the European war are of immense value to us, many conditions that we must meet are peculiar to this country.

MILITARY FUNCTIONS OF AEROPLANES

We will first consider the various military functions (becoming more and more distinct), as we understand them at present. It must be borne in mind that other important uses will, in all likelihood, develop. The aeroplane itself and its uses in war are so new that it is impossible to predict, with any degree of accuracy, the developments in even a few months. At present the aeroplane is being used in war for reconnaissance, fire control, rapid transportation of important officers or communication, demolition of valuable structures by bombing, and to attack hostile aeroplanes in order to prevent them from performing these functions.

1*a—Strategical-Reconnaissance Machines*

For this work the fuel capacity should insure a flight of at least 500 miles without stop. The average speed during this flight should not be less than 80 m.p.h. The *military load* consists of one pilot, one observer, a sketching outfit, a camera, a wireless set, and navigating instruments.

The general rule is becoming more and more firmly established that no military aeroplane should be entirely defenseless against the attack of hostile aeroplanes.

This and all other service types should carry one or more machine guns, and the general arrangement of the system should be such as to permit extensive fields of fire in important directions.

The useful load, that is, fuel plus the *military load,* and the speed range, determine the power required. A powerplant of about 200 h.p. would apparently satisfy most economically this problem, the primary requirements of the powerplant being reliability and fuel efficiency.

Assuming this, the fuel will weigh between 700 and 800 lbs. The military load will be almost 600 lbs. The complete aeroplane, fully loaded, will weigh over 3,500 lbs.

This aeroplane would also be adapted for long-distance transportation of important communications or officers.

1*b—Tactical-Reconnaissance Machines*

The fuel capacity of this type should insure a continuous flight of at least 250 miles at a speed of not less than 85 m.p.h. The military load should be about the same as that carried in the strategical-reconnaissance machine.

A powerplant of about 125 h.p. is desired, the primary requirement being reliability. The fuel will weigh about 225 lbs., the aeroplane loaded, somewhat less than 2,400 lbs.

2—*Field-Artillery Fire-Control*

The tactical-reconnaissance machine can perhaps perform this duty, but it appears that the fire-control machine should be slower, and that one of its primary requirements should be an extremely good field of vision. The engine should be of 125 h.p., or perhaps less.

3—*Long-Ranger Bombers*

We here attack a more difficult problem, owing to the heavy useful load with which we must climb from the starting field.

There will probably be a wide range in sizes of machines intended for this duty. We will discuss what we might call an average type at the present time.

The fuel capacity should permit going out at least 200 miles and returning safely, starting with a load of bombs weighing, say, 400 lbs. The machine should be capable of defending itself from hostile aircraft, so that it can operate independently of escort.

It appears that we need at least 250 h.p. and that, depending upon the total useful load, 300 h.p., or even 350, would not be too great.

If we assume 300 h.p., the fuel weight will be at least 900 lbs. and the total military load, including bombs, about the same.

This aeroplane will weigh, loaded, between 5,000 and 6,000 lbs.

4—*Pursuit Machines*

The function of this type is to attack and drive off hostile aeroplanes of any of the three first-mentioned types, preventing them from accomplishing their purpose. In fact, the employment of this type should afford a sort of offensive defense against hostile aircraft of all descriptions.

While the types 1a, 1b, 2 and 3 are interested primarily in objects *on the ground,* the pursuit type is occupied solely with events *in the air.* This type is at present divided into the one and two-place subclasses.

a.—The *one-place machine* carries fuel for two hours at full speed, about 130 m.p.h. The pilot is the only occupant. He controls the machine and operates the machine gun, or guns, of which there can be from one to four. He usually aims the gun, in action, by "pointing" his aeroplane.

All characteristics are sacrificed to reasonable limits in order to obtain rapid climbing ability, high speed, rapid climbing ability *at* high speed, and the greatest possible dodging ability, or "handiness."

In the engine, reliability must be sacrificed to a great extent to obtain low weight per horsepower, in order that the necessary attributes of the aeroplane can be obtained. Between 90 and 130 h.p. is desired. At present by far the greatest percentage of engines in this type of machine are of the rotary air-cooled type.

b.—The *two-place machine* carries fuel for three hours at full speed, about 110 m.p.h. Space is provided for two men, the pilot and the gun operator. This is, of course, somewhat larger and less agile than the one-place machine and, it is believed, is rapidly losing its popularity in favor of the smaller type. The power required is from 110 to 160 h.p.

5—*Oversea Reconnaissance*

a.—The long-range machine of this type must carry fuel for six hours at not less than 75 m.p.h. Two men, wireless-transmitting set and navigating instruments are carried. The 300-h.p. plant used on the bomber should answer for this type satisfactorily, the greatest requirements being reliability and fuel efficiency.

b.—The machine used for short-range reconnaissance and coast-artillery fire-control must carry fuel for three to four hours at speed of not less than 75 m.p.h. Two men, navigating instruments, wireless and other signalling apparatus will be required. The 200-h.p. engine used in the land strategical-reconnaissance machine should answer.

SOME PROBLEMS IN CONSTRUCTION

It is important that engineers work out the mechanical details of a great many problems in construction, among which are the two-propeller system, the reduction of vibration, the development of light engine starters, gasoline supply systems, devices required for safe landing and improvements in wing and propeller design.

The Two-Propeller System

When an all-round field of fire is necessary, the best arrangement is to carry the two or three operators and the main supply of gasoline in a central body, and to drive the machine by two propellers—one at each side of this central body.

By such an arrangement machine guns can be fired forward, in attack, and to the rear, in retreat, with extensive fields of fire in both directions, above and below, to right and to left. This attribute is always desirable, and, in some types, as for instance in the bombers and reconnaissance machines, is essential.

These propellers can be either tractor screws or "pushers." The left-hand propeller should turn clockwise and the right-hand propeller counterclockwise. This symmetrical arrangement is a great advantage, in that it permits equalized torque and gyroscopic effects when turning in different directions. In addition, it makes for safety, because the downward velocity imparted to the inboard parts of the two slip-streams that strike the horizontal tail-surfaces produces an inherent tendency toward nose heaviness without power and toward tail heaviness with power. We can, therefore, design so that the line of thrust is considerably above the center of gravity, compensating for this, and obtaining another convenient feature.

A fourth great advantage of such a system is the fact that great power can be transmitted with good propeller efficiency without demanding excessive diameter and retaining satisfactory structural safety factors. It is highly desirable that the line of thrust of the propeller be kept below the center of gravity of the aeroplane, unless the two-propeller arrangement, as described above, be used; a propeller of large diameter, with sufficient clearance, necessitates a high landing gear with its many great disadvantages. It appears extremely difficult to build a propeller of wood, of satisfactory strength (if the speed of revolution be high), giving good efficiency, to transmit more than 160 h.p. Peculiarly stringent climatic conditions making for rapid deterioration have increased this difficulty. In fact the tendency to reduce cylinder diameter and increase crankshaft revolution speed is already necessitating a gear between crankshaft and propeller-shaft in order to keep the propeller speed below 1,300 r.p.m., which is considered desirable.

A fifth advantage of the two-propeller arrangement is that the total resistance of the air to progress through it of the complete aeroplane while flying under power will be diminished owing to the fact that less total projected area of bodies will lie in the propeller slip-streams. The velocity of the air striking objects lying in the slip stream is, say, 20 per cent higher than the velocity of air not in the slip stream. The resistance varies about as the square of the velocity. Therefore, all other things being equal, less power will be required to overcome the total resistance.

Arrangements with Two Propellers

Four different systems for two-propeller installation have been suggested:

1. Two engines, one on each side, mounted out on the wings. The fundamental weakness of this system is that these great masses, removed so far from the center of gravity of the aeroplane, produce great moments of inertia, and consequently slow periods of oscillation. The machine is "logy" and probably not satisfactory for any but "hydro" purposes, in which case a "snappy" machine is impossible at best.
2. Two engines mounted in the central body between pilot and observer, each driving its own propeller through bevel gears and shafts, or by other method, the two systems being independent.
3. One large engine, mounted in the central body, driving both propellers, one propeller at each side.
4. Two engines, mounted in the central body, with a system of clutches connected with the transmission system in such a manner that either engine, or both engines, can drive both propellers, it being possible for the pilot to shift during flight.

The last system presents many advantages over the others, but it is entirely possible that excessive weight and complexity will render it impracticable. The system, as a whole, *must be reliable.*

In the design of any system of transmission for the two-propeller arrangement, the engineer must bear in mind that the structure of the wings supporting the propeller and transmission is very light and rather flexible, usually vibrating during flight.

The information at hand indicates that, to date, no successful aeroplane of the two-propeller type has been developed, but it is urged that the possible advantages are such as to warrant great effort on the part of engineers toward this improvement.

Methods of Reducing Vibration

The problem of reducing vibration of the aeroplane in flight, initiated by the engine, is a serious one. It is difficult to realize, without actual experience, the viciousness of this vibration, especially when the engine is of the eight-cylinder type, even though it is running normally. After one experiences this vibration, it is easy to understand why ignition systems, gasoline-supply joints, water-cooling systems, delicate instruments, and even wire terminals and structural joints of the aeroplane itself, deteriorate so rapidly.

The vibration throughout the aeroplane can of course be reduced by better design of the engine mounting, but we cannot hope to eliminate it entirely in this manner, if the engine itself is not of the proper design. We must not, in this connection, get the idea that the engine is always operating at the same speed during flight. We can, for instance, if flying at extremely high speed, turn the crankshaft over at, say 2,000 r.p.m.; whereas, if our sole object is to remain in the air without losing altitude, as when spotting for artillery fire, we can use a crankshaft speed of, say, not more than 1,200 r.p.m. The vibration at any speed should not be excessive.

Starting Motor for Engines

The development of light starters is a matter of immediate importance. For instance, a seaplane equipped with two engines, one out on each wing, would be utterly useless without reliable starters. It seems quite probable that electric starters will be preferable, if the weight can be reduced sufficiently, and if the danger of spilling electrolyte be eliminated. It appears that any engine of over 140 h.p. requires a starter.

Reliable provision for starting the engine in extremely cold weather is necessary.

Gasoline Supply-System

To date none of our pilots is anxious to fly across country with any except gravity feed.

The gasoline supply-system, Figs. 1 and 2, required by the U. S. Army for twin-engine seaplanes, is as follows:

The flow of fuel shall be from the main supply tank in central body to the gravity service-tank located at the center of the upper wing; from gravity service-tank by gravity, along the lower wing panels, to the small headers at the carbureters of the two engines, and from the small headers in each case to the carbureter.

These tanks shall have fuel capacities sufficient for operation at full rated power, as follows: Main supply tank, 4 hr. 35 min.; gravity service-tank, 25 min.; each header to carbureter, 1 min.

The design and material of the gasoline supply-system throughout shall be such as to obtain extreme lightness as far as consistent with strength and resistance to corrosion.

Main Gasoline-Supply Tank in Central Body

This shall be divided by one vertical longitudinal bulkhead and one vertical transverse bulkhead into four gasoline-tight compartments. Proper swash-baffle plates shall be installed. The tank shall be of sturdy construction throughout.

The main tank shall be of such shape as to properly fit the central body. It shall be securely fastened in the structure of the central body in such a way as to be undisturbed by any possible motion of the aeroplane. The structure shall be such that the tank will withstand an internal pressure of at least 7 lbs. per sq. in. without leakage of gasoline. The design shall be such that there will be no ill effects from drumhead vibration.

Suitable means shall be provided for quickly and conveniently filling and for completely draining all four compartments.

Each filling hole shall have a suitable screen filter, 100 mesh to the inch.

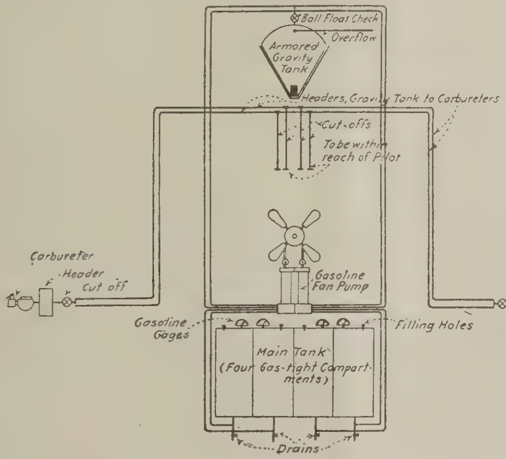

Fig. 1—Gasoline Supply System (Suction Pump) for Military Seaplane

Plugs or caps for filling holes shall be air-tight and provision shall be made for "safetying" them positively in place. Suitable gaskets shall be used.

Provision for reducing to a minimum the rate of leakage due to bullet holes by lining the inside of the tank with a special material, is highly desirable.

Suitable gasoline-supply gage shall be installed.

There shall be leads from the bottoms of the four compartments to the upper gravity service-tank.

Supply of Gasoline from Main to Gravity-Service Tank

This shall be by two methods:

First.—Air-fan driven pump, so designed as to maintain proper air pressure in or suction from the main tank system, and to operate satisfactorily during flight. An alternative and better method will be to install two such fans, each fan maintaining pressure in any two of the four compartments of the main tank. When any one or two of the four compartments of the main tank leaks (because of bullet hole or through other cause), an arrangement by which pressure or suction can be maintained through the leads from the tight compartments is highly desirable.

Second.—A hand air-pressure pump in or at the side of the pilot's cockpit, which can be used when not in flight or in an emergency. This pump shall be located in the cockpit at a point as high as will permit convenient operation by the pilot in his seat. It shall be provided with a suitable air-pressure gage, visible to the pilot. Its connections with the compartments of the main tank shall be at a point as high as practicable to prevent the pump becoming flooded with gasoline. An arrangement by which pressure can be maintained by the hand air-pressure pump on tight compartments of the main tank when one or two compartments leak is highly desirable.

Construction of Gravity Service-Tank

This tank shall be of sturdy construction, securely supported in place, and provided with the proper number of swash-baffle plates. It is considered desirable to protect this tank with light V-shaped armor on the under side.

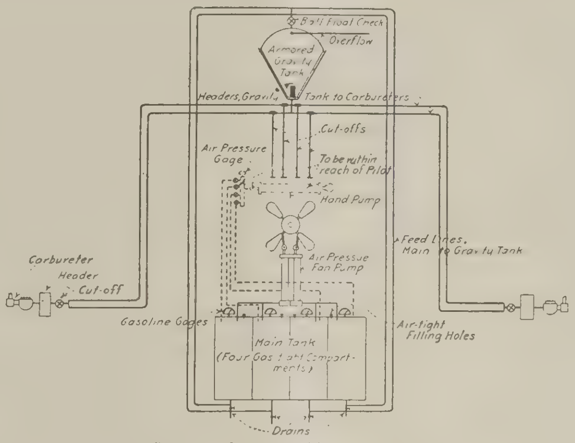

Fig. 2—Gasoline Supply System (Air Pressure) for Military Seaplane

An automatic ball-float valve shall be provided to prevent overfilling of this tank. A suitable overflow pipe out of the top center of the gravity service-tank shall be provided. The gravity service-tank shall be of good stream-line form.

A suitable gage, visible to the pilot in his seat, shall be in the gravity service-tank. This gage shall be connected at such a point that it will register accurately through the range of normal flight attitudes.

From the gravity service-tank the gasoline shall be led to a small header at each engine by leads within or along the lower wing panels. Between gravity service-tank and each header shall be two independent, and, as far as practicable, isolated tube leads. Each of these four leads shall connect with the lower part of the gravity service-tank at such a point that the supply will not be interrupted at any normal flight attitude.

At the connection of lead to the gravity service-tank shall be a suitable wire gauze strainer, mesh 100 to the inch. Provision shall be made to prevent the possibility of air pockets in the gasoline leads from the gravity service-tank. Provision shall be made for permitting the pilot, while in his seat, to cut off the gasoline supply, through all leads, from the gravity service-tank to the carbureter headers.

Headers Between Carbureter and Service-Tank

A small cylindrical or stream-line tank or header shall be installed in the immediate vicinity of each carbureter. The gasoline shall pass through this header after coming from the gravity service-tank.

Its capacity shall be sufficient for one minute's running at full-rated horsepower. The central portion of this header shall be on a level with the jets of the carbureter. The axis of the cylinder shall be vertical.

The cylinder shall be of sufficient length to give satisfactory head, either when the aeroplane is in normal attitudes or when it is upside down.

Provision shall be made to prevent gasoline from backing up into the service lead instead of coming into the carbureter when the engine is upside down.

Suitable gasoline cutoff shall be installed near this header in such a position as to be convenient for operation to a man standing on the ground or on the wing.

Tubing for Fuel Leads

At every point these shall be of the highest grade material best suited for the purpose. It shall be approved by the inspection department. Flexible tubing shall be 5/16-in. No. 2 copper tubing. Non-flexible leads shall be piping as approved by the inspection department.

Tubing shall in all cases be of diameter sufficient to give free and continuous flow under severe vibratory conditions. In the absence of other instructions the bore shall be 5/16-in.

All tubing shall be securely fastened in such a way as to resist wear, vibration, and chafing. The number of joints and fittings shall be reduced to a minimum.

Unions, ells, tees, and fittings, to be S. A. E. standard, approved by the inspection department. The method of connecting all leads shall be approved by the inspection department. All fittings shall be readily accessible for inspection, adjustment, repair, or removal.

It will be seen that it will require considerable ingenuity to work out satisfactorily the mechanical details of this complicated arrangement. For instance, a satisfactory method of insuring feed from the compartments of the main tank, up to the gravity tank, when one or more of the main compartments are punctured by shot, is required.

Metal Construction for Aeroplanes

It is suggested that the field for development of steel aluminum alloy in the structure of aeroplanes is one offering considerable inducement. The authors have gone briefly through the layout of an aeroplane in which every strength member is of metal. In this design it was found most convenient to use seamless steel tube at some places, welded tube at others, channel section at others, I-section and L-section, at others. At a few points aluminum alloy was used, at other points pure aluminum, assumption being made that this aluminum was *rolled* in such a way as to give it certain desired physical characteristics.

(*Continued on page* 466)

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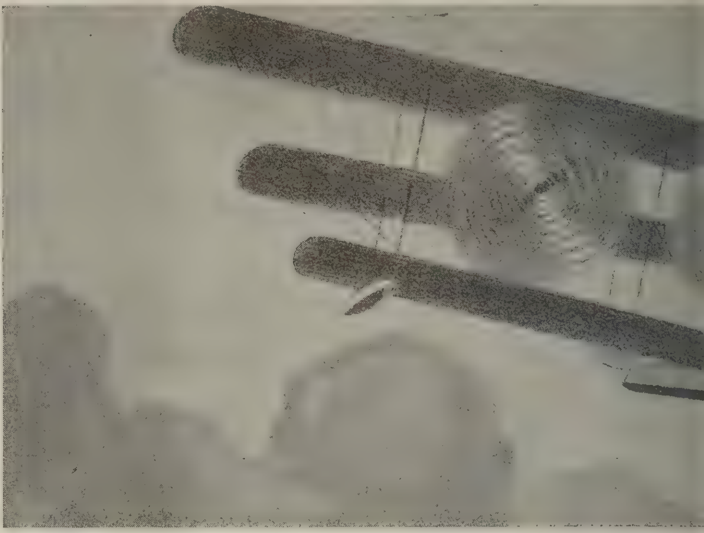
Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.



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HOW TO LAND AN AEROPLANE

By Lieut. H. A. DARGUE

PROBABLY the greatest difficulty in the preliminary training of a student is the landing of the aeroplane; he can make a get-away, climb, fly around, make figures of eight and spiral down close to the ground long before he can really make a good landing. The normal landing of an aeroplane is effected by first starting down for the landing in a normal glide; when some twenty to thirty feet above the ground the elevator should be slightly pulled back so that the machine describes a curve which will be tangent to the ground. This is the ideal landing. However, it is found necessary in the training of students to instruct them not to make their curve in landing tangent to the ground, but to a plane some two or three feet above the ground and then after having reached that plane, and the machine is gliding in a horizontal position, while losing its flying speed, the elevator should be slightly pulled back to overcome the settling of the machine. A point will finally be reached where the machine has lost flying speed and it settles easily to the ground as the elevator is pulled further back to its limit. The points of support for the aeroplane should then hit the ground simultaneously.

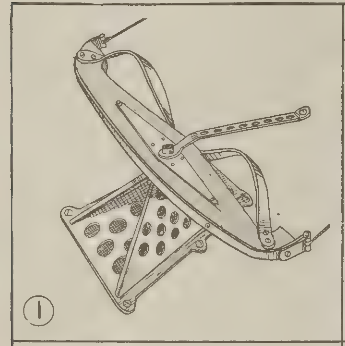
It seems very difficult to get a student to make this form of a landing; when close to the ground he seems to have an uncontrollable desire to get the machine, on the ground and so jockeys the elevator, producing a waving motion of the machine and finally ending up by bouncing hard on the ground and rebounding into the air.

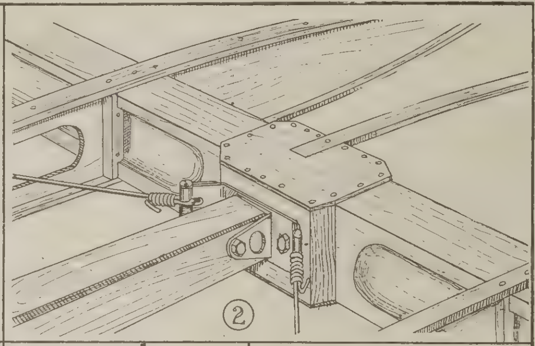
Local conditions will always effect this ideal landing and air disturbances must therefore be taken into consideration. When close to the ground a puff will sometimes hit the machine, changing its elevation. This always tends to disconcert the student in completing his landing; if the machine is raised

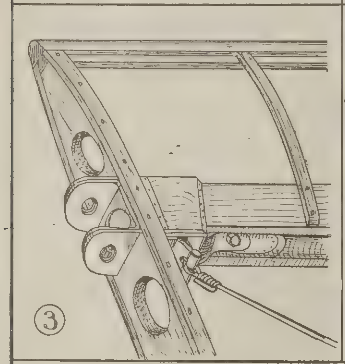
(*Continued on page* 466

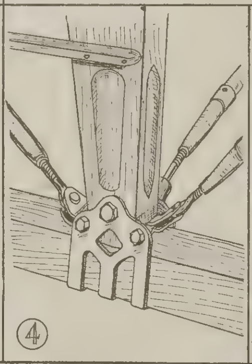
CONSTRUCTION DETAILS—THE STANDARD H-3 TRACTOR

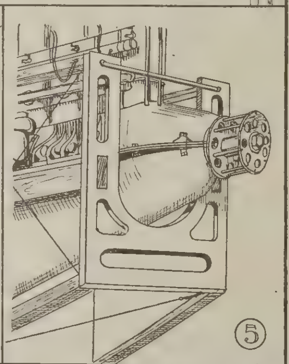
ALL fittings of the Standard H-3 are of sheet metal, welded together, coated with enamel and baked. A few of the fittings are illustrated in the accompanying sketches.

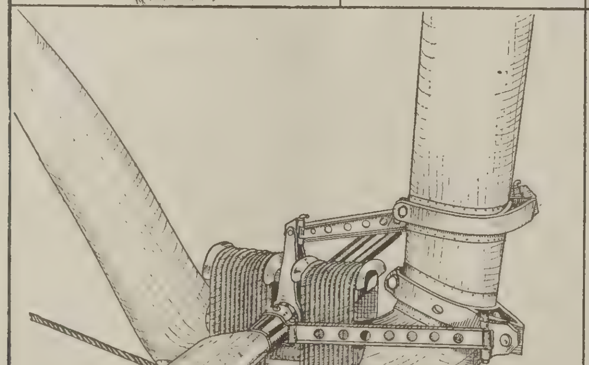


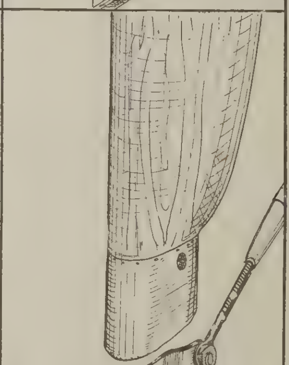












1—Foot Bar for the Rudder

The bar itself is of walnut, supported on a lightened sheet steel block, and braced at the rear by a steel bar. A strip of sheet steel runs along the forward edge of the bar, held in place by countersunk wood screws. Each end is bent around the pin to which control wire is attached, lapped back upon itself and welded. A wood screw goes through the two thicknesses of metal. Stout leather straps for the foot grip are secured by round-head wood screws and copper washers.

2—Internal Wing Construction

The sketch shows fitting used in attaching the spruce compression member to the main wing spar, which also serves as a terminal for internal bracing wires. Fitting held to main spar by two bolts. A block is placed at either side of main spar at this point, with a veneer plate on top and bottom, all glued and tacked in place. Strut socket rests here, and the bolts that clamp around the wing spar are prevented by the blocks from slipping along the spar.

3—Wing Attachment to Fuselage

As the wings are swept back, ribs are at an angle to leading and trailing edges and wing spars. The fitting is composed of three principal parts, one at either side of spar projecting through the end rib, and a piece on the outside of rib which joins the other two, all welded into one fitting. Attachment to the spar is by two bolts. Anchorage is provided for the internal bracing wire.

4—Fuselage Fitting

Uprights and spacers in the fuselage are tapered and channeled. Fittings for their attachment to the longerons are of such a nature that similar fittings can be employed throughout, even though the longerons taper in section and the spacers vary in thickness toward the rear of the fuselage. The metal is cut away at points where its omission will not weaken the fitting.

5—Engine Plate

This plate is the forward terminal of longerons, and carries the forward end of the engine bed. It is of heavy gauge steel, with openings formed for lightness, the edges of which are turned in to secure rigidity. The upper portion of the plate is left open to make easy the installation and removal of motor, and a detachable steel bar is run across the top. In the finished machine the plate is covered in by a hand-formed streamline aluminum nose.

6—Shock Absorber

The shock absorber works on a "pantagraph" principle. The axle, bound by suitable curved plates and rubber cord, is attached to the U chassis by two shackle bars, one placed above the other. Being bound this way, the axle must move upward in a vertical path, instead of following the arc of the circle as when a single shackle is employed. By the direct vertical movement, the strain on the rubbers is evenly distributed. Shackles are clamped to the forward part of the U chassis members, which are of laminated ash. Where clamps are attached to chassis, protection to the wood is provided by strips of sheet bronze tacked in position. In the sketch, the landing wheel has been omitted for clearness.

7—Strut Sockets

Strut ends are sheet bronze capped. A single bent pin holds the strut in place in the socket, which is easily removable. Socket in three parts, welded together to a single unit. Four bolts hold the socket plate to the wing beam without piercing the wood. Lightening holes are carefully located.

FOREIGN NEWS

FRANCE

Paris, Jan. 1.—During 1916 Allied aviators made 750 raids into hostile territory, 900 enemy aeroplanes were shot down and 81 captive balloons were destroyed, according to figures just compiled. Of these raids the French made 250, the British 190, and between them 180 in Macedonia.

French aviators shot down 450 enemy machines, the British 250, while the French destroyed 40 balloons and the British 27. The remaining balloons and aeroplanes were brought down by anti-aircraft guns.

The record by months showed continual improvement in the French aviators until the bad weather started. In January they made two raids, in February, nine; March, thirty-five; April, thirty-one; May, forty-one; June, eighteen; July, forty-eight and August, forty-nine.

Headed by Commandants Robert and Baptista, the Portuguese aviators wear sky-blue uniforms, but their steel helmets have visors different from the French.

On December 29 Adjutant Lufbery, the American, brought down an enemy aeroplane, making his total six.

Paris, Dec. 8 (by Mail).—Georges Carpentier, French heavyweight champion, will require nearly four months to get into condition for the ring—and it is very doubtful whether the French army authorities will consent to his leaving active service for so long a period.

Carpentier himself, here recuperating after a bad spill from his army aeroplane at the front, made this declaration to the United Press today. The French pugilistic star is in Paris for a brief time and his condition is such that he must make daily visits to the hospital for treatment.

"I am in very bad condition," Carpentier said, "I consider that nearly four months will be necessary to get me into shape again. The doctors say first of all I must have complete rest, with nothing but the mildest sort of exercise—like cross-country walking. Then I would have to begin a process of long, gradual training.

"If by fighting with gloves I can help my country more than I can by piloting an aeroplane, I'm naturally willing to do so—if I am permitted."

On Thursday night, January 4, French aerial squadrons showered projectiles on the aviation field at Grisolles and on the railway station and barracks at Guiscard, where it was observed that four incendiary fires and several explosions occurred.

On Friday night enemy encampments south of Spincourt, munitions depots at Longeau Farm, and the railway station at Mesnil St. Nicaize, also were bombarded.

GERMANY

London, Jan. 3.—Two Zeppelins have been destroyed at Tondern, Schleswig, by a fire due to defective electric wiring, in a recently constructed double shed, says a Reuter despatch from Copenhagen.

This dispatch quotes the Ribe (Jutland) Sitta Tidenda.

Berlin, Dec. 29, (by Wireless to Sayville.)—Lieutenant Gustav Leffers, the noted German aviator, who recently was decorated with the Order Pour le Merite, has been killed in an air engagement on the western front, the Overseas News Agency announced today.

A news dispatch in mid-November credited Lieutenant Leffers, 19 years old, with having brought down nine British aeroplanes.

GREAT BRITAIN

Details of the latest developments in aeronautics and the work of the R. F. C. were given January 1st, by Flight Lieut. Lloyd Faulkner, Royal Flying Corps, who was recently injured and is now on a furlough in this country.

"Our battle-planes," he said, "weigh two and a half tons and are driven by two Rolls-Royce motors of 250 H.P. each. They have twin propellers and can make over a hundred miles an hour. Other big planes have motors of three hundred h.p. driving a single propeller."

"The smaller machines which carry only a pilot are much faster, the Sopwith 'Pup' makes 138 miles; the Nieuport 'Bullet,' 135 miles; the Spad, 140 miles and the new machine whose name may not be mentioned, 138 miles an hour."

Mr. Faulkner states that this new machine is especially valuable in Zeppelin work, as it has a great climbing rate. Mr. Faulkner says that the machine has climbed 15,000 feet in seven and a half minutes.

"Once at the front, I found that our work was divided into four classes. The first is the reconnoissance during which we sometimes flew from 100 to 150 miles back of the German trenches. This work is done by regularly organized squadrons, in which the most important machine is the one carrying the camera. The reconnoissance unit is composed of five battleplanes and ten or twelve Nieuport scouts or Sopwith 'pups,' little fast machines, making close to 140 miles an hour and carrying only one pilot and machine gun. These little machines are the destroyers, or guards, for the big battleplanes. The big machines each carry at least two men and two guns.

"When in flying and working formation, the reconnoissance squadron is arranged in this way. The camera battleplane flies at about 5,500 feet, with a fighting battleplane on either side, flying at about 6,000. To the rear, directly behind each of the fighting battleplanes, are two more battleplanes, flying at 7,000 feet. These five machines fly 100 to 110 miles an hour. The little destroyers with their faster speed, fly all about them, always ready to attack an enemy squadron.

"The second important use for aeroplanes is artillery observation work. First Lieutenant Vernon Castle was doing this when I last saw him in the late Fall, and had been mentioned in dispatches for his excellent work. Before going up, the pilot arranges his signals with his battery. He uses wireless, what we call a clock Morse code, and as soon as he finds his objective, usually a German battery, he lets his gunners know where to fire. In connection with this, I learned that it takes a 15-inch howitzer shell, weighing about a ton, forty-five seconds to travel 22,000 yards. I'd give the directions and signal and forty-five seconds later the shell would land. If it destroyed the German battery or other object, we'd move on to another place that needed attention from the howitzers.

"Observation pilots also watch every movement behind the enemy's lines. It has been arranged that if they see a large or important movement, such as the march of an army division or a large section of transport, they can give a certain signal which will call for help from every gun in that section. Where we were this meant that at least 500 great guns would be slamming away in no time. Three hours is the flight time for an observer—it is nerve-wrecking work and few can stand it longer. The machine is always being fired at.

"A third use to which we put our machines is night flying, which is mostly bomb work. The Germans, for some reason or other, do not fly at night. Our bombers travel in squadrons of 50 to 100. They start out in the dead of night and fly very low, not more than 300 feet up. It is practically impossible to hit them and there are few casualties among our men. This night bombing was forced on us by the fact that the Germans move their troops and stores at night. We usually tried to destroy some railroad junction, or station, or a depot where ammunition was stored. Zeppelin sheds were also sought after. The Royal Flying Corps has done very efficient work in these night raids—engines have been blown off the tracks, trains wrecked and much other devastation accomplished.

"The last important work done at the front is the patroling. This is done by two machines acting together and flying at five to six thousand feet. High above them, soaring and watching, at about 20,000 feet, are some of the little, fast fighting machines. These we know as 'strafers,' and it is their object to drop onto any German machine that tries to cross over our lines. This patrol work, like all the other regular flying, is done without regard to weather. Pilots have gone up in a seventy-mile wind, in snow, sleet and rain. Nothing stops the pilot at the front except death or the smash of his machine."

Baron Cowdray has been appointed chairman of the British Air Board, in succession to Baron Sydenham, resigned.

Baron Cowdray accepted the post on the express condition that he receive no salary.

Baron Cowdray, who is 60 years old, was formerly Sir Weetman Pearson, and is best known in this country as a multi-millionaire contractor and competitor of the Standard Oil Company. The Pearson syndicate controls vast oil holdings in Mexico and is largely interested in the National Railroad of Mexico and in improvement enterprises in Vera Cruz, Puerto Mexico and Salina Cruz.

London, Jan. 6.—Raiding operations on a big scale along the Somme front by the British were announced in tonight's official statement from British Headquarters in France. North of Beaumont-Hamel, two German outposts were seized. The counter-attack was beaten off and the positions were consolidated.

Another raid was carried out against the German positions southeast of Arras. Under a heavy screen of fire, the British penetrated the hostile front for a wide distance as far as the third line trenches. Many dug-outs were destroyed with bombs.

ITALY

A New Italian Carburetor

The principal merits of the Feroldi carburetor are said to be economy, smoothness, flexibility, cool running, and all the virtues therewith associated.

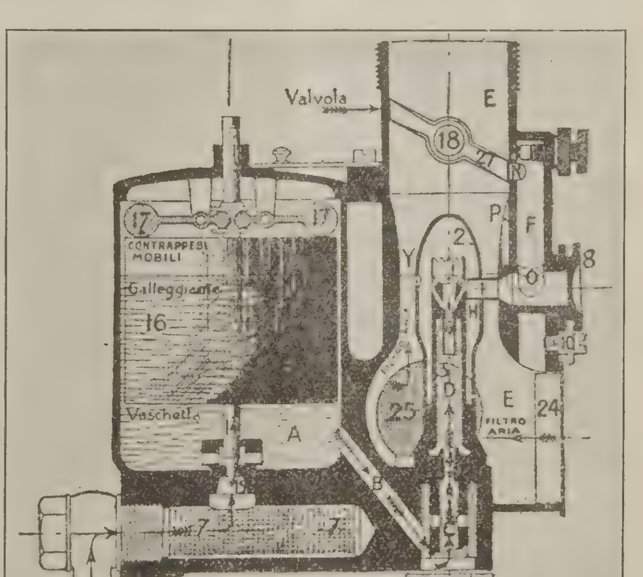
No vivid originality is claimed for it, but rather the ideal in all small as well as the large matters of design. It seems to have found favor on all sorts of Italian craft, due to its many evident points of merit.

At N and P is a slide-valve accentuated by the throttle 27.

Note, too, that space between the two jets through which all the "essence" has to pass, and in the first of which it is braked and thoroughly broken up.

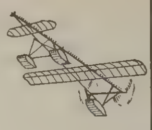
With the butterfly valve shut, the narrow way G I F M makes an adjustable pilot jet, of proved convenience in the case of rotaries which are sobered down in an admirable way when feeding through it.

At all positions between closed and full throttle, a well-diluted mixture is provided, while there is a fair approach to a "straight-through" action all along.



The Feroldi Carburetor

MODEL NEWS



Edited by G. A. Cavanagh and Harry Schultz

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Life Saving Kites

According to Mr. S. Hill in the *Illustrated World* for January

Life saving from shipwrecks at sea by means of dirigible kites has been made possible through an invention of Dr. Frederick Riehl, a champion swimmer, residing at Alameda, California. The invention is now being tested by the United States Steamboat Inspection Service.

The invention is made up of a pair of twin kites, carrying an anchor which may be dropped at any desired place by release through the kite string. This anchor gives a firm base from which the kites may strain but not escape.

Each kite is six feet by six feet and is diamond shape. The kite line pulls upward at an angle of about forty-five degrees; whereas, the usual line shot out by the like-saving crew pulls laterally. Using the latter, a wrecked man might be drowned by being dragged through the waves instead of up and over them, as with the kite line-breeches buoy device.

It is an axiom that the wind is landward in any storm causing wrecks. For this reason the kite is flown from a vessel and the twine is loosened with the kite.

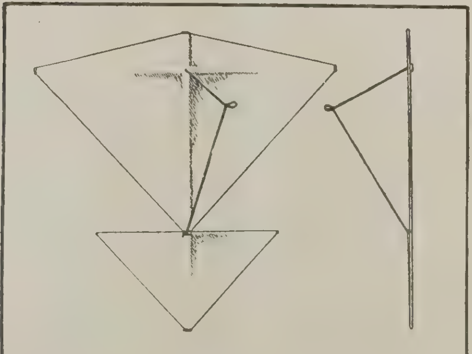
With the looped end of the twine around your body—under one arm and over the neck—you can jump into the water. Then turn your feet in the direction you are being pulled, put your hands to your sides and float—simply float. One could not sink with a kite pulling and a strong line of twine tugging one up out of the water.

The framework of the kite is light wood covered with strong muslin. In the unusual event of a seaward breeze a kite could be sent out over the wreck, with a long drop line, to which another line would be attached connected with the main kite line ashore. By means of a pulley in an upright frame on the beach, the kite pulls the lower line in as the upper line pays out.

Refreshing stimulants may be sent to the wrecked passengers by means of the kite line with its detachable pulleys. Food may be suspended by the pulleys, which wheel down the angle of the kite line to the wreck.

The new life-saving dirigible kite has been recommended to the United States Government for use on deep-water vessels, at life-saving stations, and at coast guard stations.

50,124 KITE. William A. Collins, Brooklyn, N. Y. Filed Sept. 7, 1916. Serial No. 118,937. Term of patent 3½ years.



A Hydro-Glider

The Hydro-Glider shown in the photographs herewith was designed and constructed by Mr. P. H. Spencer, of Hartford, Conn.

A Model Ornithopter

(*Continued from page* 441)

The natural curvature of the wing of a bird naturally renders it easier to move it upwards than downwards. A valvular wing containing a sufficient number of valves would tend to reduce, or even counterbalance any support during the up-stroke, and the bird would be compelled to rely solely on its momentum for the maintenance of its altitude during each up-stroke of the wing. Valvular wings have been a pet subject with aviation inventors of a certain type, as long as the writer can remember, but no practical results have ever followed from such. Not only do they introduce many additional mechanical complications, but they set up all kinds of irregular air flows, which not only greatly augment the head resistance, but skin friction as well. Moreover, we have no real evidence of any such in the world of flying creatures.

Wing Flexure

If the flight of a flapping bird be observed directly from underneath—the movement of the wings appears to be an alternating extension and flexure; being spread out to its full extent one instant and contracted the next. From this it would appear that during the down-stroke the wing is spread out to take full advantage of the maximum area of sustentation and flexed or contracted during the up-stroke in order to have minimum resistance to upward vertical motion.

Major Baden-Powell, head of the English Boy Scouts, constructed a paper cylinder, of a diameter approximately equal to the spread of a certain bird's wing. The interior of the tube was smoked, and the bird being put in at one end, flew through the tube, the tips of his wings scratching off the smoke as he flew. The cylinder was then opened, and a very clear diagram obtained. In another experiment two pieces of smoked paper were hung parallel face to face at a distance apart approximately that of a certain bird's wing, and the bird allowed to fly between the two smoked sheets.

These experiments most conclusively show that a flapping bird's wing is flexed during the up-stroke, as there was scarcely any sign of a scratch during that stroke.

The bird employed was a canary, and the actual marks in the last experiment were such that each wing stroke had rubbed off an imprint somewhat resembling the whole line of an interrogation point. The fully extended wing, at the commencement of the down-stroke, first rubbing off a broad curved streak, and then gradually tapering this streak upon a curved line to a point as the wing became flexed, ready for the up-stroke.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

An Essay on Dirigible Navigation

(Note: This Essay was NOT Awarded a Prize by the Aero Club of America)

DIRIGIBLE navigation, for the most part, had been popular with the German people more than any other race. This fact has mystified the scientific world for a long time, but we feel that the question has been solved at last. In August, 1894, Count Zeppelin (he wasn't a Count then—didn't have a sou to his name), was sitting in a refreshment parlor (Hof Brau Haus), drinking a glass of milk when who should come in but Kaiser Wilhelm, Czar Nicholas of Russia, and two dachshunds—national dogs of Germany. The royal gentlemen were traveling incognito—only nine out of every eight persons recognized them, and seating themselves down at a table near the Count, with the dachshunds at their feet, they glanced over at Count Zeppelin, who was flying paper models all over the room, meanwhile swearing softly to himself:

"Guess it won't work, Nick," said the Kaiser. "Righto, Bill," returned the Czar. Suddenly Count Zeppelin looked up, his eyes resting on the dachshunds. With a wild cry of triumph he rushed forth from the bar—that is refreshment parlor—into the street and bent his course homeward. Arriving at his home he unbent his course, put it in his little case for that purpose and mounted the stairs. However, as the stairs showed no intention of taking him any place, he dismounted and walked up. "Ach" (*we speak German fluently*), he said: "If one of those dachshunds can be such a shape and live, I will model my airship after it, call it the Zeppelin and become famous!" He sternly resolved to waste not a minute, so after thinking it over an hour he sat up all night working on the invention.

When he had finished it he saw that it was a perfect model of the dachshund. As he was penniless he decided that something must be done at once. By forgoing the usual pleasures of life for two years he managed to scrape up a few million marks, both in money and on his anatomy. Using the former he hired a gang of workmen, built the machine, took it to the Kaiser's private office and sold it to him. The Kaiser was so pleased with it that he made Zeppelin a Count, gave him a nice little factory all his own, and told him to go as far as he liked.

The Count embraced the opportunity—he was wedded to his work—and built lots and lots of airships, making each one bigger, more powerful—and more expensive—than the last.

The Zeppelins are Germany's greatest asset in the present war. In fact the Kaiser has so many of them that every once in so often he sends a fleet of them to raid London in the secret hope that some of them may be destroyed. It was getting so bad in Berlin that the whole place was simply cluttered up with Zeppelins, and one couldn't go duck hunting for fear of shooting some airship captain full of holes.

However, in view of the fact that all the aeronautic authorities claim that the Zeppelin is very valuable, we will not dispute it.

Roald Amundsen, the discoverer of the south pole, is at New York to buy aeroplanes for use in his 1918 expedition into north polar regions. When Amundsen points his plane toward the north pole there will probably be little danger of the radiator boiling.—*Little Rock Gazette.*

Ruth Law flew from Chicago to New York at the rate of 92 miles an hour. The Broadway gang will bet even money that magnetic attraction made the flight possible, and that nobody can fly from New York to Chicago at 60 miles an hour.—*Louisville Courier-Journal.*

It seems strange to many men that a little girl wants to come out and carry off the aviation records, when it is the duty of women to remain quietly at home and sweep floors and bake bread.—*Exchange.*

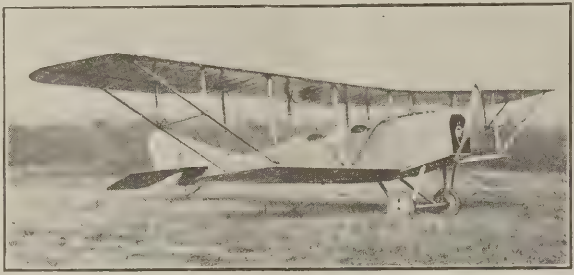
Naturally the first Congressman to make the trip in an aeroplane from his district to the National Capital was a Republican. No Democrat could be induced to make such a trip for fear of losing his mileage.—*Exchange.*

Amsterdam, Dec. 16.—The *Kolnische Zeitung* amuses its readers by a little story of two German aviators, flying from their base at Varna, who came down at the little town of Magnolia in the Dorbrudja. So pleased were the natives to see the two aviators that they gave them a pig each.

The question arose how to transport the "costly gifts" to the base. The problem was solved by making room in the body of the aeroplane, and the quartet flew away for Varna. Apparently the pigs felt quite at home, for the *Kolnische Zeitung* says that the four enjoyed the trip.

IT SAYS HERE THAT THE GREAT TROUBLE IN MAKING AEROPLANES IS THE SCARCITY OF SILK. IT SAYS SILK IS THE ONLY MATERIAL LIGHT ENOUGH, YET STRONG ENOUGH TO MAKE THE WINGS. THAT'S ODD - THEY OUGHT TO BE ABLE TO FIND A SUBSTITUTE
I'VE GOT IT! I JUST THOUGHT OF THE VERY STUFF, I'LL GO OUT AND BUY SOME AND SHOW MY SCHEME TO MUTT
YOU SAY YOU'VE FOUND A SUBSTITUTE FOR SILK IN THE BUILDING OF AIR CRAFT? WHAT IS IT?
PAPER!
PAPER! WHAT KIND OF PAPER IS STRONG ENOUGH TO FLY WITH?
FLY PAPER!
FLY
OH, TANGLE FEET!
WRONG SIDE UP

Courtesy N. Y. World.



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(*Continued from page* 462)

by the puff the elevator should be moved forward slightly, so as to again assume the normal glide, or the position in which the machine was formerly. In making the curve tangent to the ground, should the puff, by any chance, decrease the elevation of the machine, then the elevator must be used rapidly, especially if the machine is close to the ground. In this case the elevator would, of course, be pulled back further and in exceptional cases the power might have to be applied. The first landings made by a student should always be from a straight glide so that he has nothing to think about except his elevator, and does not have to bring the machine out of a bank or a turn; gradually the landings should work up to a spiral landing. First landings should always be made directly into the wind, later across the wind, and finally with the wind. However, these more advanced forms of landing should not be taken up until after the course to make a pilot an expert aviator has begun.

(*Continued from page* 457)

Ignition

Two 8-cylinder Splitdorf "Dixie" magnetos. Weight, 30 lbs. Firing order, 1-8-3-6-4-5-2-7.

Two spark plugs per cylinder, located at side of head, under intake valve.

Lubrication

Pressure of 50-100 lbs., to all parts; gravity to sump. From sump to tank by separate pump. Tank to pressure pump, etc.

Weight

Weight of the motor complete with magnetos, water and oil pipes, starting handle, wiring, but without tanks, radiator, water, oil, tachometer and muffler, 876.25 lbs.

(*Continued from page* 459)

It is suggested that, even with the present standard method of construction, there is great room for improvement in the material and method of heat treatment of the metal fittings used in conjunction with wood and wire. Especially where fittings are bent both with and across the grain, a special alloy appears advisable. The same holds for fittings shaped by die-forging. Chrome vanadium steel, to comply with S. A. E. specifications 6130, and heat treated in such a way as to render it best in each case, is suggested. It is believed that the total weight of an aeroplane can be materially decreased, without sacrifice of strength, and hence superior performance obtained, by the use of better steel.

The construction of floats of metal for seaplanes appears to be a possibility as is also the use of metal for aeroplane propellers. It is possible that the entire body might be made of light pressed steel, or aluminum, with holes to decrease the weight cut at proper places, and covered with linen.

Flexible Piping

Satisfactory flexible gasoline lead has not yet been developed. Such a lead should resist the action of vibration, should be light in weight and resist cutting or denting. The method of making joints is important. The duct should be carefully sweated into proper terminal fittings. Tube ends of fittings should have spiral springs wound around them for at least 2½ in., thus preventing sharp bends and distributing the effects of vibration. All unions should be ground, with spherical seats, and threads should be cut clear and sharp, with all burrs removed. The inside diameter of tube should not be less than 0.35 in.

A *flexible* pipe, light in weight, of material suitable for leading the *exhaust* away from the engine would be useful.

Muffler Requirements

In military service a hostile aeroplane is usually first discovered by hearing it. A muffler satisfactory as to low weight, flexibility, loss of power through back pressure, durability against corrosion, and efficiency as a muffler, is highly desirable.

Shock Absorbers for Landing Gear

Rubber is not satisfactory as a shock absorber for heavy aeroplanes. Neither is it satisfactory as a military supply, especially when it is subjected to heat and the direct rays of the sun. It seems necessary to develop a steel-spring shock-absorber. The action of this steel spring must, however, be damped by an oil cylinder. Without this damping the action is such as to cause the aeroplane to bound excessively upon striking the ground.

Brakes Required When Landing

The development of a brake to reduce the run of the aeroplane after it has touched the ground, thus permitting it to land in restricted areas, appears to be a difficult problem. It is a moot question whether such a brake is desirable when the simple two-wheel landing gear is used, as its action has a tendency to throw the aeroplane over on its nose. Where more than two wheels are used, however, a brake fitted to the two main rear outside wheels in such a way that the pilot can, from his seat, operate either brake, or both brakes together, would be desirable. Such an arrangement would permit him not only to stop his machine quickly, but also to steer it on the ground to some extent.

Folding Landing Gear

The development of a landing gear that can be submerged within the body by the pilot, during flight, would materially increase the speed of the aeroplane by reducing the "parasite" resistance. Such a mechanism should be light in weight, sturdy and simple.

(*To be continued*)

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RECENT CURTISS PATENTS

Patents have recently been granted Glenn H. Curtiss for an exhaust heater for air inlets, described as follows:

In combination, a multiple cylinder motor, exhaust conduits therefrom occupying positions substantially in the same longitudinally extending plane, and a heater casing having a longitudinal section of streamline form inclosing said conduits in battery.

In combination an aircraft, a driving motor therefor having an exhaust conduit, a streamline heater casing disposed in a longitudinally extending plane incasing said exhaust conduit, a carbureting device for said motor, and a conduit connecting one end of said casing with said carbureter, said casing having an induction opening at its opposite end.

In combination an aircraft having an inclosed body, a motor located in said body and having an exhaust conduit projecting beyond the same, a streamline heater casing disposed in a longitudinally extending plane and incasing said exhaust conduit, a carbureting device for the motor located within the body of said aircraft, and an intake air conduit interconnecting said carbureter and one end of said heater casing, said heater casing having an induction port at its opposite end.

In combination an aircraft, a multiple cylinder motor therefor, exhaust conduits for said motor lying approximately in a longitudinally extending plane, a streamline heater casing, the body of which is pierced transversely by said exhaust conduits, a carbureting device for said motor, an air intake conduit connecting said carbureter with one end of said heater casing, said heater casing having an induction opening at its opposite end.

In an aircraft having a streamline body in combination, an internal combustion motor located in the body of said aircraft and having a multiple number of cylinders, exhaust conduits projecting without said body casing and lying approximately in the same longitudinally extending plane, an air heater casing having a streamline form, transversely pierced through by said exhaust conduits in battery, a carbureting device within the body of said aircraft, and an air intake connecting the said carbureter with one end of said heater casing, said casing having an air induction port at its opposite end.

Application for the patent was filed Sept. 18, 1915, and patent granted Dec. 1916, under serial No. 51,477.

Another patent, on a hull for flying boats, filed a month later than the previous patent, and granted under serial No. 56,603, is described in the claims that follow:

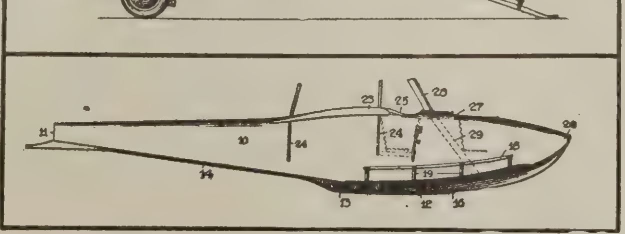
In a hull for flying boats, a V-shaped hydroplaning bottom, and a forwardly located longitudinally elongated fin member of substantially uniform thickness in lateral extension of the V-sides of said bottom.

A boat hull for flying boats having a hydroplaning bottom of substantially the same width as the beam of the boat, and relatively thin fin members in lateral extension of the hydroplaning bottom, each fin tapering forwardly in substantially streamline form.

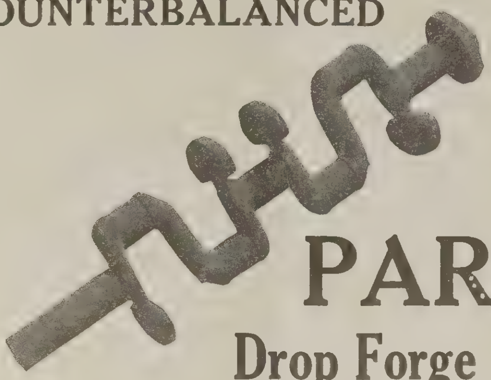
A hull for flying boats having a forwardly disposed V-shaped hydroplaning bottom and fin members co-extensive with said bottom in the form of longitudinally laid planks of substantially no displacement, the width of which planks are in lateral extension of the V-sides of said bottom.

A hull for flying boats having a hydroplaning bottom, longitudinally elongated relatively thin fin members in lateral extension of the bottom of the boat, and exposed struts bracing the fins to the side of the boat above the chines thereof.

A hull for flying boats having a hydroplaning bottom, a fin member in lateral extension thereof, a stringer laid longitudinally of the fin at a point removed from the side of the boat, and the strut braces between the said stringer and the side of the boat.



Upper Diagram Shows Exhaust Conduits; Lower Diagram Flying Boat Hull Having Hydroplaning Bottom.



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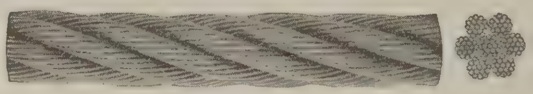

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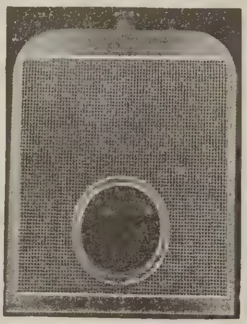

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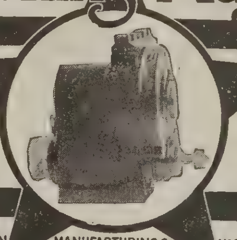

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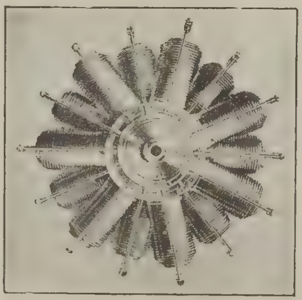

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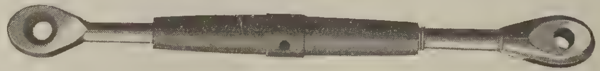

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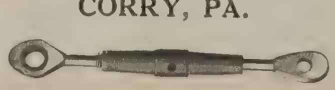

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Principles of Aeroplane Construction by Rankin Kennedy	$1.50
Aerial Navigation by Dr. A. F. Zahm	3.00
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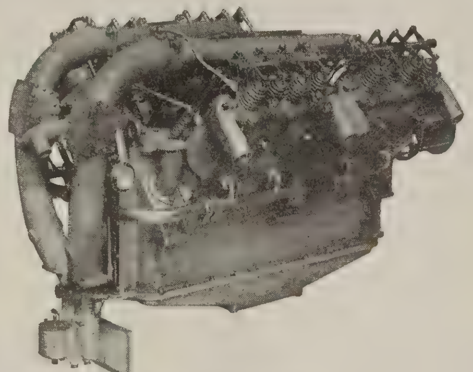

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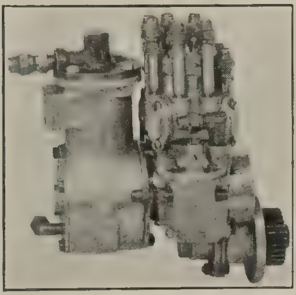

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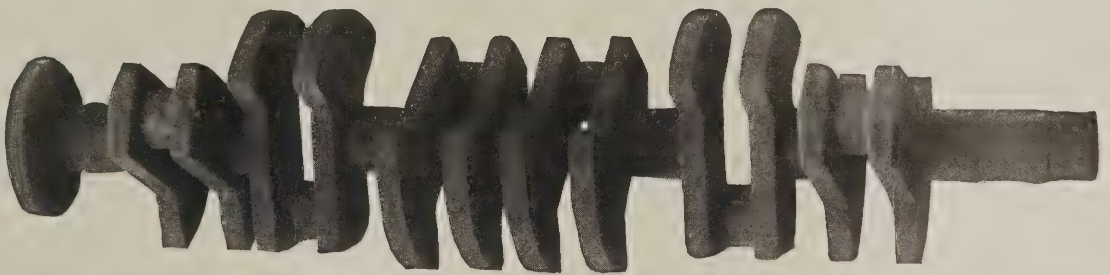

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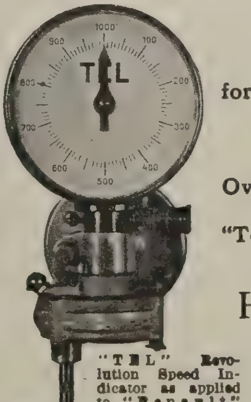

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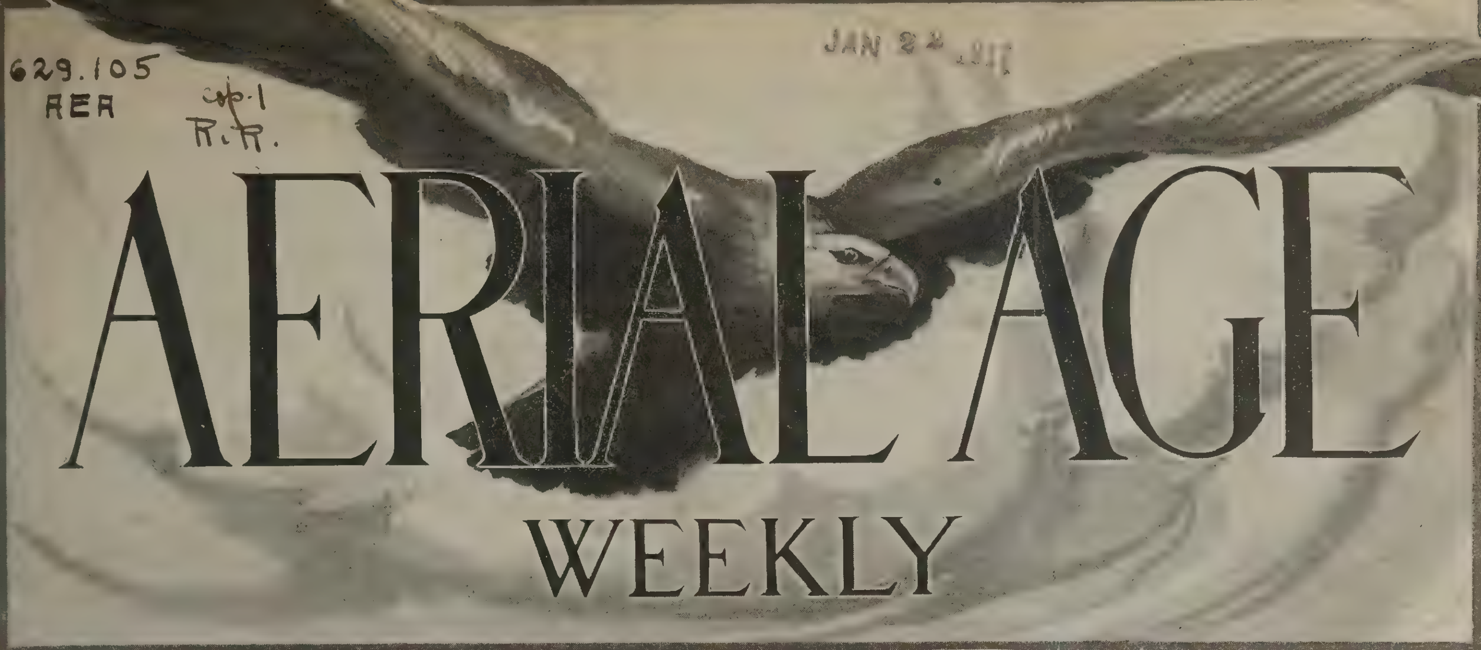


AERIAL AGE WEEKLY

Vol. 4, No. 19 JANUARY 22, 1917 10 CENTS A COPY

Universal Training of Vital Importance to the Nation

By John Hays Hammond, Jr.

Canada to Spend $80,000,000 in Aeronautics

The Problems of Aeronautics

By Lieut.-Col. George O. Squier

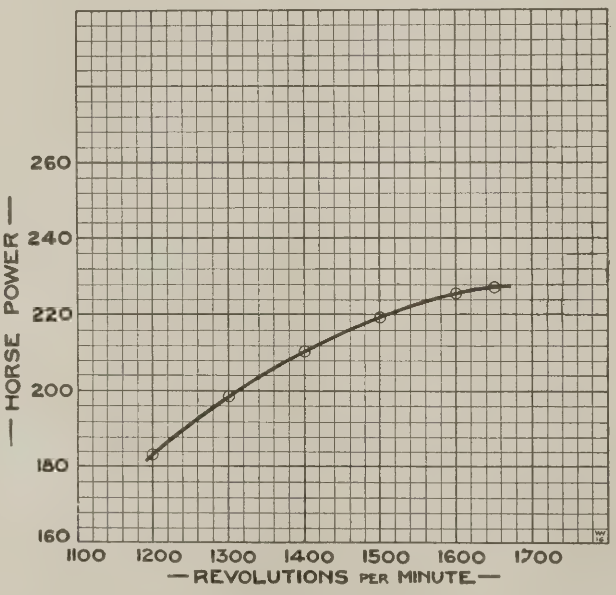
Construction and Operation of Kite Balloons

By Ralph H. Upson

Curtiss

MODEL VX-3 motor was used by Victor Carlstrom on November 2nd in flying from Chicago to Erie, Penna., a distance of 452 miles, in 3 hours 57 minutes.

Owing to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
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TYPICAL of the practical correctness of many innovations introduced by Sturtevant aeroplanes, is the small light radiator which fits neatly into the top wing. The circulation system is greatly improved, and the weight and resistance reduced by this simple and efficient solution of a difficult problem.

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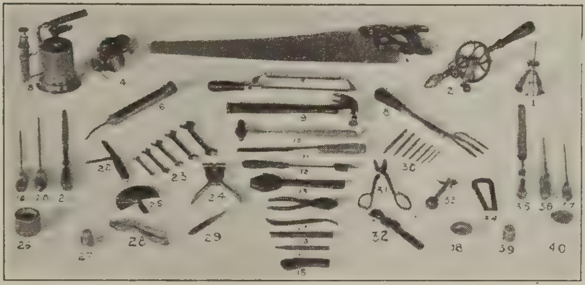

THE accompanying illustration shows the compactness and completeness of the Cooper Aeronautical Tool Box. With the assortment of tools shown the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

After five years of flying experience these tools have been selected to meet every requirement for Aeroplane service. The size of the box is 28 x 9 x 10 inches.

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for
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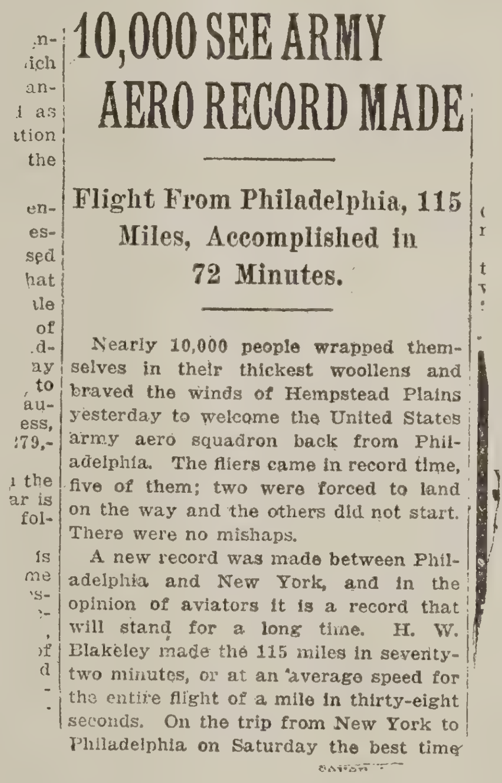

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Flight From Philadelphia, 115 Miles, Accomplished in 72 Minutes.

Nearly 10,000 people wrapped themselves in their thickest woollens and braved the winds of Hempstead Plains yesterday to welcome the United States army aero squadron back from Philadelphia. The fliers came in record time, five of them; two were forced to land on the way and the others did not start. There were no mishaps.

A new record was made between Philadelphia and New York, and in the opinion of aviators it is a record that will stand for a long time. H. W. Blakeley made the 115 miles in seventy-two minutes, or at an average speed for the entire flight of a mile in thirty-eight seconds. On the trip from New York to Philadelphia on Saturday the best time

From Jan. 1st N. Y. *Sun*

This **notable performance** was made possible by a **Thomas equipped** L. W. F. Machine driven by Mr. W. H. Blakeley. **Thomas Aeromotors** throughout the flight to Philadelphia and return showed **consistent reliability** with entire freedom from engine trouble.

Contractors to U. S. Army and Navy.

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500,000 feet of Straight Grain Alaska Spruce,

of a quality which will meet the French specifications as follows: Length, 10 to 30 feet; width, 6 inches or wider; thickness, 2 inches or thicker. Sixty-five per cent of this parcel of lumber will be 16 feet and longer.

Price $145.00 per thousand feet, f. o. b. New York. Inspection and acceptance New York.

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Price $155.00 per thousand feet. Terms: Confirmed bank credit at time of entering contract and cash against loading bills of lading. Freight allowed to Atlantic Seaboard.

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Vol. IV NEW YORK, JANUARY 22, 1917 No. 19

UNIVERSAL TRAINING OF VITAL IMPORTANCE TO THE NATION

By JOHN HAYS HAMMOND, Jr.

THE future history of the United States will show that one of the vital turning points of her development was taken by the sixty-fifth Congress. This pivotal point is the question of Universal Training. Upon it will be directly based the victories we shall achieve in the future or the defeats that we shall suffer. France was saved not at the battle of the Marne, but at the hour when she adopted the three year law. England won the Jutland Bank Battle as far back as 1907, when she inaugurated a more virile policy in strengthening her fleet. The victories and defeats of modern war are decided not on the field of battle, but in the legislative bodies who frame the laws for preparedness.

The lessons of the European War are slow in reaching us; that they will ever reach the voting mass in the United States is impossible. Even our military experts are only slowly grasping a realization of the stupendous forces in modern conflict. The General Staff of the Army advocated in 1915, a million and a half men to be available for fighting. Today they advocate three million men. Germany has already lost more than that number from her lines.

The administration has given us a well balanced and sound naval program, but it is questionable whether we can man the ships we build. It is far easier to build machinery than to train men. Morale is as essential to victory as guns, and it takes infinitely longer to produce. Whatever fleet is ultimately at our command must be backed by an army. Great Britain will always have the mastery of us upon the sea, but with the army that it is possible for us to raise from our great population we could defy any nation on earth.

Should we ever have to meet a first class power in war, the entire physical and moral force of the American people will have to be excited in the national defence. Unless this force is scientifically wielded and organized by years of training, it will go for naught. England prepared her armies while her allies held back the enemy. It is not probable that our enemy will be held while we prepare, certainly not until our statesmanship has become less insular and until by shrewd alliance we protect ourselves with another man's guns.

It is probable that Universal Training will suffer the fate of the shuttlecock. The responsibility for undertaking it will be batted to and fro from the legislators who *dare not* to the public who *care not* until the rally is over and it falls to earth. For the welfare of the country, a vigorous movement must be undertaken to avert the defeat of the Chamberlain Bill, whose loss spells calamity.

Twenty-seven Naval Militiamen From Five States Being Trained at Pensacola Naval Aeronautic Station—$500,000 Needed for Aeroplanes for Twenty-two States

TWENTY-SEVEN naval militiamen from five different states are being given a course of training at Pensacola, which is to last only three months, owing to the limited number of instructors at the station—which is due to the general shortage of personnel in the Navy. Universal training is badly needed to remedy this shortage.

The militiamen and the states they come from are as follows:

California

Lieut. Frank Simpson; Samuel Kroner, H. V. Reynolds, C. M. M., P. S. Ryan, J. G. Weyse.

Massachusetts

Ensigns Godfrey L. Cabot and Norman Merrill; Leon T. Blood, R. E. Self, C. J. Thurlow, Harold Hudson.

New York

Lieuts. Lee H. Harris, and —— Rutan; Chas. B. Vandy, Elwood H. Neener, George C. Matteson, Chas. A. Blanchard.

Rhode Island

Ensign J. K. Park; George B. Proy, Charles J. Whitford, Henry M. Fallon, Raymond N. Estey.

Washington

Ensign D. R. Van Kirk; W. H. Boteler, W. R. Garland, A. J. Natho, H. W. Roughly, C. M. M

These Naval Militiamen arrived on or about November 2nd and are at Pensacola for three months' training. March 1st they will leave for their respective states and four more men from each state will take their places. The militiamen are getting three weeks' instruction in th motor shop on motors, one week on magnetos (Berling, Dixie and Bosch) and the Zenith carburetors. Then three weeks in the erecting shop erecting Curtiss, Burgess, Sturtevant and Thomas machines. These, so far, are the makes that have been tried out in any number. Standard hydros are soon to be delivered also.

When the militiamen have passed their exams on these three departments they go on the beach as airmen and look after the machines used by the regular officers who are flying and instructing.

After a man has had his "jump" he receives 50% more in his pay.

There has been an influx of men from several ships to receive training in aeronautics at Pensacola of late, and the barracks are nearly full, there being about 20 regular officers, 6 naval militia ensigns, 20 naval militiamen—about 320 men and officers all told.

Commander Mustin and his staff were somewhat relieved of the pressure of work by the arrival of Constructor Richardson and Lieut. Bellinger, but the shortage of personnel is still excessive.

The routine at Pensacola is as follows:

6.30 A.M.	Reveille.
7.00 "	Breakfast.
7.50 "	Muster in and go to work.
8.00 "	Turn to.
11.45 "	Knock off.
12.15 P. M.	Dinner.
12.55 "	Muster.
1.00 "	Turn to.

4.15 P. M. Knock off.
5.00 " Supper.
9.00 " All unnecessary lights out except standing lights.
10.00 " All lights out except standing lights.

There are four motors in use here, namely, Curtiss 100 H.P. OXX-2, Hall Scott O, 125 H.P., Sturtevant, 140 H.P., Thomas 135 to 140 H.P.

The motor course is an invaluable one, as there are about fifty motors in the motor shop at all times, most of these being Curtiss OXX-2 with 2-VX-2 types 160 H.P. A few of them are being overhauled at all times, giving the students an opportunity to study them thoroughly and compare motors as to parts and design. They also get practical experience in pulling down motors and assembling them, as well as test stand experience. There is a well equipped machine shop on the ground floor of a two-story brick building, with a blacksmith shop next door on the left. At present the test stand is on the same floor with the motor school, and it is almost impossible to study while a motor is being tested. However, a test stand house has been erected near the warp in front or on the water's edge for testing, which will make study in the motor shop possible.

Among the enlisted men are four aviators, some of whom, like William A. Sankey, who is quite a veteran now, not only for having taken his license in the early days of aviation, but because of having flown in Mexico and having quite a record in California.

He and W. D. Bonner and W. A. Detrich have cheerfully gone through their apprenticeship in expectation of graduating to some more useful occupation. Bresman, the fourth aviator graduated to the position of inspector. Promotion of these aviators will encourage others to enlist.

The only provision for aeronautics for the naval militia in the estimates for naval aeronautics for 1918 is a provision for 12 training aeroplanes at $9,000 each and spare parts, operation and maintenance of same, the whole amounting to $197,840. This sum should be increased to at least $500,000, to provide the aeroplanes needed to organize aviation sections in the Naval Militia of the 22 states which have such an organization.

Canada to Spend $80,000,000 in Aeronautics

A NUMBER of reports have been current in the past two or three weeks telling of tremendous aeronautical activity being planned for Canada. A brief outline of what these plans are is given in the following statement from the N. Y. *Herald:*

"According to several Canadians who were at the Automobile Show, including a couple of officers and others who are in this country in the interests of Canadian war supply concerns, there is to be an appropriation of $80,000,000 for aeronautics this year.

"It is expected that Canada soon will be in a most enviable position as regards the development of an aerial service, as well as in regards to factories for the turning out of aircraft for use of the Allies.

"The Dominion government has already supplied close to five hundred aviators to England, and many more are in constant training with the understanding that after the war Canada will have a permanent air service with five hundred trained airmen.

"Candidates for aerial service must be from nineteen to twenty-five years of age and they are required to pass rigorous physical as well as mental examinations before being admitted to training, and, having completed the course of training, most of those who have reached England have advanced rapidly.

"The Canadian authorities are looking further ahead than the war in their policy of training a corps of aviators, for they realize the tremendous prospects for the employment of aeroplanes for transportation in Canada.

"Aeroplanes are increasing in size, speed and carrying capacity, and there are many difficult problems of transportation in Canada that can be solved only by the aeroplane, one of the chief of these being the carrying of mail to remote or otherwise inaccessible places."

Swedish Purchasing Committee Praises American Aeroplanes

AMERICAN aeroplanes and aeronautic motors are the equal of the best European products, and will soon outstrip them, according to the report made to their Government by the Swedish officers who were sent here a short time ago to investigate aeronautic developments. This inspection commission consisted of Baron Cederstrom and Lieutenants Netzler, Krokstedt, and Wimbald, all of whom have returned to Sweden.

Their report was not made public, and it was awaited with much interest in aviation circles here. The Aero Club of America has received a copy of the Swedish newspaper *Dagens Nyheter,* in which it is reproduced with illustrations of the leading machines and motors of this country.

The Swedish commission describes the various machines inspected here, including the large Curtiss triplane, with its fifteen-ton lifting capacity; the "baby speed scout," with its speed of 120 miles an hour; the Martin biplanes, the Burgess seaplanes, and the Sperry gyroscope. The commission places itself on record as saying that when one considers the short time that the American aeroplane industry has had inducement to develop better aeroplanes and motors, a great deal is seen to have been accomplished, and in their opinion America will soon outdistance Europe in both aeroplanes and motors.

The $17,000,000 appropriation made by Congress last year for aeronautical development is spoken of as offering great inducements to the manufacturers here, and it is also pointed out that the United States can use aeroplanes for utilitarian purposes, and that in the near future mail-carrying routes will be in operation. The commission further remarks that the American aeronautic industry is now equipped properly to produce good aeroplanes and satisfactory motors of carrying power, in large quantities.

Switzerland Demands More Aeroplanes and Captive Balloons for Protection

EVEN Switzerland is awake to the great need of aeronautics for defense. The General Staff of the Swiss Army has come out strong for more aeroplanes and captive balloons, and its stand has been endorsed by the *Revue Militaire Suisse* (The Swiss Military Review). The August issue of that well-known military publication sees the necessity of a popular subscription as well as a governmental appropriation for an adequate aeronautical defense. We have had the article translated and it is given in full herewith:

PROPOSED CHANGES IN SWISS MILITARY ESTABLISHMENTS —DECREASE OF THE CAVALRY

(*From the Revue Militaire Suisse, August,* 1916)

The Press Bureau of the General Staff of the Army has recently transmitted to the newspapers a circular on aeronautics in the Swiss Army. After dwelling upon the enromous progress developed in military aviation since the beginning of the war, the General Staff states that "This rapid advance compels us to greatly increase the number of our military aircraft if we wish to be abreast of conditions in this respect."

This statement is followed by a significant remark:

"If it (aviation) does not progress as rapidly as some would like, the reason must be sought not only in technical difficulties, but also in the expense which the establishment of this new arm entails.

"The Swiss people, like others, has manifested by voluntary gifts its desire to furnish the Army with the necessary means for the accomplishment of this task. Thanks to these gifts, we have been able in a relatively short period of time to procure a certain number of aircraft. But the end is still distant, and to attain the degree of preparation necessary for combat *the military budget must also make its contribution.*"

While recognizing the great value of dirigibles, the General Staff believes that "for us, this means of combat is still beyond our reach on account of the great expense which it involves."

As for captive balloons, their rôle which was uncertain at the beginning of the war is now fixed as an agency for the observation of artillery fire.

"We who must face the necessity of employing all defensive weapons within our reach must likewise resort to this procedure; we must create an aerial fleet at an early date and *for this purpose collect the necessary funds.*"

This statement is very clear. The circular of the General Staff is intended to prepare the ground for a request for appropriations for aviation, and perhaps also for a popular subscription for the increase of our modest aerial fleet.

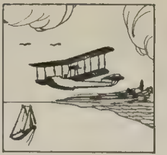
This will give material for fine declamations to the anti-militarists of the Federal chambers and for sleepless nights to the minister of finances. But the money will be found even should it be necessary to waste less money for other purposes. Whatever may be said, much money is being earned and spent in Switzerland; in spite of the increase in the cost of living, very few people have materially decreased their scale of living, and many have increased it. Aviation and aeronautics are popular with our people; they will be glad to make some sacrifices to increase the efficiency of this service.

It is moreover possible to counterbalance the expenses required for the aviation service by the decrease of an arm which is also very expensive and whose rôle in the present war has been insignificant. The circular of the General Staff tells us that "one of the principal functions of aircraft consists in making reconnaissances; they have shown themselves so well adapted to this purpose that *they have almost entirely supplanted the cavalry for distant reconnaissances.*"

Is this a simple academic statement, or must we see in it—since we are talking about aviation—a hint of the decrease of the cavalry? Even before the war we were taught that the principal rôle of the cavalry was not combat but exploration. If it has really been supplanted in this domain by the aviators, we may well ask ourselves what purpose is served in maintaining at enormous expense a large force of cavalry?

We have good infantry, artillery and engineer troops; but this infantry and artillery are blind because the traditional eye of the cavalry is powerless to pierce the curtain of the modern service of security. In order that our infantry and artillery may be able to fight they must see. In order that they may see, they must be given the modern implements of exploration and observation, the aeroplane and the captive balloon. This can be done at relatively slight expense. Our General Staff has understood it and our people will also understand it.

THE NEWS OF THE WEEK



Army and Navy to Build a Zeppelin

Decision to undertake immediately the constructon of a large rigid airship of the general Zeppelin type has been announced by Mr. Daniels, Secretary of the Navy, and Mr. Baker, Secretary of War, as the result of the recommendations of a joint Army and Navy Board, which has been studying the problem.

Here is the official announcement:

"A joint committee of Army and Navy officers, representing the aeronautic branches of both services, the General Staff of the Army and the General Board of the Navy, after a study of the question of rigid airships, has recommended that the construction of a large airship on the general Zeppelin type be undertaken at once under the direction of the chief constructor of the Navy and has also recommended that to successfully prosecute this work and secure the most effective co-operation of a joint technical board, composed of the chief constructor of the Navy, as senior member, and three officers from each of the two services as members be appointed.

"These recommendations have been approved by the Secretary of War and the Secretary of the Navy, and plans for undertaking this work immediately are being worked out. The cost of construction will be borne equally by the Army and the Navy from appropriations made by the Sixty-fourth Congress.

"The importance of the rigid airship for military and naval purposes is fully realized, and it is believed that the problems involved can be worked out better, more rapidly and more economically by joint action than if each service took them up separately."

Curtiss to Exhibit at Motor Boat Show

The Curtiss Aeroplane and Motor Corporation of Buffalo will exhibit a super-America type of flying boat at the Motor Boat Show, to be held in Grand Central Palace, January 27-February 4.

Newark Site for Packard Motors

Feist & Feist, Inc., sold for the estate of Cynthia F. Dryden, Nos. 1020,1022,1024 and 1026 Broad street, Newark, N. J., having a total frontage of 116 feet and a depth of 365 feet, running to Orchard street, where the frontage is 22 feet. The property has two fine dwellings; one formerly occupied by the late John F. Dryden and the other by his son-in-law, Colonel Anthony Kuser.

The Kuser property is the old homestead of the Thomas family, of Revolutionary fame. It was the Newark headquarters, then known as Elizabethtown, of General Lafayette. Both of these homes will be razed, and in their place the buyer, the Packard Motor Car Company, will erect a very substantial building, which will be used as its Northern New Jersey headquarters.

Burgess Co. to Increase Plant

The Burgess Company has just awarded a contract to the New England Structural Company, of Boston, for an addition to their plant, which will comprise a building 300 feet by 100 feet.

The location selected for the new factory is one specially adapted to the requirements of the company, as it is directly on the waterfront. The channel way from the plant will lead directly out to sea, which will allow of the machines being taken to the lower bay without having to be driven through the harbor when it is filled with yachts.

Buys American Machinery

Dr. Enoch, Thulin, Landskrona, Sweden, one of the most noted aeronauts in Europe, is in this country making purchases of machinery for his aeroplane factory in Sweden. His factory turns out two machines a day and he is here to get additional equipment so that the output may be increased.

Searchlight to be Tested at Mineola

A 1,500,000 candlepower searchlight recently installed by the Government on the Aviation Field at Hempstead, L. I., will be tested in the near future to determine its worth in spotting flying craft in time of war.

Aviators will go up in biplanes, followed by "enemies." The searchlight will then find the first machine and the following plane, hidden by darkness will attack and destroy it.

The second machine also will drop various colored lights, so that persons on the ground might be directed to the vicinity of its intended prey and pick it out with the light.

The light also will be tested for use in guiding machines to land. It has a radius of four miles.

Special Information for Exhibition at the Pan-American Aeronautic Exposition

To assist exhibitors in arranging their shipments and the installation of exhibits, the management of the Pan-American Aeronautic Exposition has issued the following special information:

SHIPMENT OF GOODS—All exhibits must be marked with exhibitor's name, care of Aeronautic Exposition, Grand Central Palace, New York City. If shipped by freight or express, *all charges must be prepaid.*

When shipment is made by freight, if you have not arranged with a transfer company to pick up this freight upon its arrival in New York, we will do so for you providing you send us bill of lading. You may then pay drayage charges upon your arrival in New York.

All goods will be received at the corner of Forty-seventh street and Depew place. No goods will be permitted to be brought into or removed from the Grand Central Palace by any other entrance.

A competent clerk will be at the receiving door to check in all receipts on goods.

INSTALLATION OF EXHIBITS—The Grand Central Palace will be open for the installation of exhibits from 8 a. m. Tuesday, February 6, to 5 p. m. Thursday, February 8, at which time the installation of exhibits must be complete and ready for opening of the doors at 8 p. m.

If necessary, exhibitors may remain until 10 o'clock, Tuesday evening, February 6, and Wednesday evening, February 7, for arranging their exhibits.

SHOW CASES—Show cases may be rented from the following concerns for the week of the Exposition: Brooklyn Show Case Company, 361 Canal street, New York City; Manhattan Show Case Company, 345 Canal street, New York City; National Show Case Company, 350 Canal street, New York City.

FURNITURE—Furniture of all kinds, desks, chairs, etc., may be rented from the Merchants and Manufacturers Exchange, Grand Central Palace, at a very reasonable rental.

When your representative arrives Tuesday, February 6, he may arrange then to select what furniture is needed.

ELECTRIC CURRENT, GAS OR WATER SUPPLY—Electric current for power and extra lighting in spaces will be furnished by the superintendent of the Grand Central Palace, for which an extra charge will be made. Electric current is *direct* 110 or 220 voltage. Exhibtors requiring electricity, gas or water supply should make application direct to Mr. Warner Paxson, superintendant, Grand Central Palace, New York City, not later than Thursday, February 1.

For further information not covered above, we refer you to your contract for space, on the back of which you will find the rules and regulations, or you may take up the matter direct with the International Exposition Co., Grand Central Palace, New York.

Aviators for Canal and Hawaii

Captain Henry H. Arnold, now at the Aviation School, San Diego, and Captain John F. Curry attached to the Signal Corps, were directed to proceed immediately to the Canal Zone and Fort Kamehameha, Hawaii, respectively, to form and command aviation squadrons there.

Mr. Evan John David Joins Flying Staff

AERIAL AGE is pleased to announce that Mr. Evan John David, formerly special representative and assistant director of the Bureau of Investigations of *The New York Tribune,* has been engaged as manager of *Flying.*

Mr. David, though still under thirty-five, has had wide experience, during which he traveled extensively and gained prominence through his mastery of economics, sociology, history, English, commercial geography and transportation.

Beginning early as a newspaper reporter, he was on the editorial staffs of the *Wilkes-Barre Daily News* and *Boston Herald* and contributed special articles to many periodicals and metropolitan newspapers.

Mr. David took his A.B. and M.A. degrees at Harvard, was Professor of English at the New Hampshire University for three years and was on the staff of the Horace Mann School at the Columbia University.

Mr. David is a most energetic and resourceful man. Energy, resourcefulness and knowledge of the world as a whole are the factors most needed to-day in aeronautics. Only by employing such factors can we hope to introduce aeronautics in other lines of human endeavor, where aircraft can be used to solve problems of transportation, for instance, just as it required knowledge of military science to apply aircraft to solve military problems.

He has not had any connection with aeronautics and is not a member of any aeronautic organization. He will, therefore, start with a clear mind and no prejudices. He has what is most essential in aeronautics today, knowledge of the world as a whole and the underweaving of the national and political situations, of economics and sociology and a vision to see how they can be applied to serve transportation. He will endeavor to take aeronautics to the outside world, thereby widening the circle of those interested in the new science. Having knowledge, vision and enthusiasm, he ought to prove to be a valuable acquisition for the aeronautic movement.

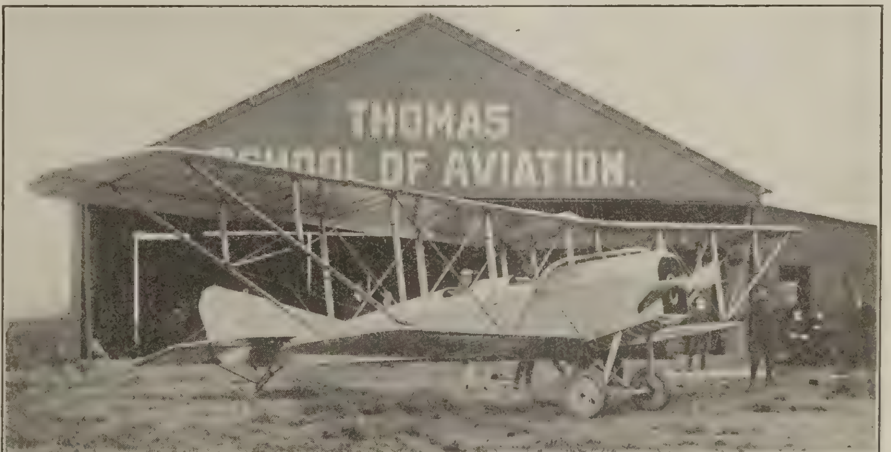
Montclair Boy to Be French Airman

Leslie Ludlam, a son of William L. Ludlam, secretary of the Montclair Civic Association, has gone to France to join the American Aviation Corps that is doing service for the Allies.

Ripolin

J. A. & W. Bird & Co. of Boston, distributors of RIPOLIN ENAMEL PAINT, have arranged to have Mr. George Price, who has been manager of the New York office, 120 Broadway, handling the Metropolitan District, for the past eight years, and who recently completed a trip through the south, engineer and handle the sales department covering the entire territory south of New York, as far west as the Mississippi, and also including the States of Louisana and Texas.

This plan places a Ripolin distributor in practically every city of 5,000 and up, developing a material advantage to the painter, and convenience to the architect in the way of prompter deliveries, co-operation, etc.



The Model D-2 Thomas Military tractor of the Type Now Being Produced by the Thomas Bros. Aeroplane Co. for the U. S.Army.

Captain Taylor Goes to San Diego

Captain Ralph Taylor, the genial officer of the Connecticut Coast Artillery who has been flying at Mineola since last summer, has left for the U. S. Army Aviation School at San Diego, where he will take an advanced course in military aeronautics and fly with a view of passing the junior military aviation tests.

Captain Taylor has a splendid record as an officer and aviator. The fact that he willingly sacrificed his commission and took a commission of second lieutenant so as to be able to go to San Diego shows his splendid disposition.

Kite Balloons for the Navy

The U. S. S. "Nevada" and "Oklahoma" are being equipped by the Navy Department for testing kite balloons for spotting purposes this year at Guantanamo, according to a statement made by Captain Josiah S. McKean, U. S. A., before the House Naval Affairs Committee. They will cost from $4,000 to $6,000 each, will carry two men each and will be about 75 to 80 feet in length and 30 feet in diameter.

Military Training for Stevens Institute Men

President Humphreys, of Stevens Institute, announced at the alumni dinner that a new course of physical training, to be inaugurated at the institute at an early day, would include training to equip graduates for service with the armed forces of the Government. The announcement caused the 300 alumni present at the Astor to cheer the speaker repeatedly. All that Stevens now requires to bring it thoroughly abreast of the most progressive development as a technical organization of the first rank is a course in aerodynamics!

Army and Navy News

Lieut. A. A. Cunningham, U. S. M. C., who was on temporary duty at the Aviation School at San Diego, Cal., has been added to the commission on the establishment of additional navy yards, the senior member of which is Rear Admiral James M. Helm, U. S. N. Lieut. Cunningham joined the commission at Portland, Ore., on January 4th, for the purpose of observing air currents and general conditions affecting aviation in connection with the sites studied by the commission.

The Sixth Aero Squadron has been ordered to be organized at Fort Kamehameha, Hawaii, by Capt. John F. Curry, junior military aviator, Signal Corps, who has been ordered to command. The Seventh Aero Squadron has also been ordered organized at the Panama Canal Zone, by Capt. Henry H. Arnold, Signal Corps, who will command the new unit.

Capt. Thomas DeW. Milling, Signal Corps, U. S. A., is to visit Harvard University, to arouse interest in a students' aero corps. If enthusiasm is shown, one of the proposed Government aero training schools may be located in Cambridge.

Capt. and Mrs. Mark L. Bristol, U. S. N., have leased the Wood cottage on Everett street, Newport, R. I., while Capt. Bristol is taking the course at the Naval War College.

Capt. Edwin A. Hickman, S. C., from detail in Signal Corps, February 25, 1917. Capt. Hickman is assigned to 17th Cavalry, February 26, 1917, and will join that regiment. (January 4, War Department.)

Master Signal Electrician Murray B. Dilley, S. C., Fort Wood, N. Y., to Fort Leavenworth, Kans., for duty at the Army Service Schools. (January 8, War Department.)

Capt. Henry H. Arnold, junior military aviator, S. C., from duty at San Diego, Cal., to the Canal Zone to organize the 7th Aero Squadron, and will assume command of that squadron. (January 9, War Department.)

Capt. John F. Curry, junior military aviator, S. C., from his present duties upon the expiration of his present leave, and will then proceed to Fort Kamehameha, Hawaii, to organize the 6th Aero Squadron, and will assume charge of that squadron. (January 9, War Department.)

Capt. John B. Brooks, junior military aviator, S. C., is relieved from present duties and to Fort Kamehameha, Hawaii, for duty as supply officer of the 6th Aero Squadron. (January 9, War Department.)

The following sergeants of the Signal Enlisted Reserve Corps are assigned to active duty in Aviation Section, Signal Enlisted Reserve Corps, with station at the Signal Corps Aviation School, Chicago, Ill.; Albert C. Adams, Joseph Van Walchshauser, Austin E. Gibson, Charles W. Browne, George J. Kinberg, George W. Sawyer, Rudolph W. Schroeder, William A. Thompson, Michael L. Gerlowski and Victor J. Picard. (January 5, War Department.)

First Lieutenant Lewis C. Davidson, infantry, from Signal Corps Aviation School, San Diego, to Fort Omaha and report to commanding officer Army.

Coast Guard News

The total equipment of the Coast Guard's aviation section is still composed solely of an office at headquarters, where is installed the "inspector of aviation." Although the establishment of this division was authorized by the last session of Congress, no appropriation was made, and the organization is, perforce, extremely visionary. Several of the headquarters staff appeared before the House Committee on Military Affairs recently to explain the needs of the service, but members of the committee refused to enthuse over the aviation section. It is extremely unlikely that the impending appropriation measure will contain any sum for this purpose. Assistant Secretary of the Treasury Byron R. Newton was one of the officials who went before the House Committee in behalf of the Coast Guard. Mr. Newton particularly called attention to the unusual situation of the machineless aviation section.

Personal Pars

Henry B. Joy, owing to the pressure of other affairs, has resigned as president of the Packard Motor Car Company, Detroit, it is announced. Alvan MacAuley, elected president of the company some months ago, had previously taken over the active direction of Packard affairs, in accordance with Mr. Joy's wish. Ever since the Packard company was moved from Warren, O., to its present Detroit location in 1904, which move was initiated by a small group of the younger wealthy set in the latter city, Mr. Joy has been credited the country over with being *the* Packard company. When J. W. Packard, founder of the concern, resigned as president several years ago, being replaced as active head by Mr. Joy, the industry felt that the latter was simply assuming his rightful position.

William R. McCulla, aircraft engineer for the Packard Motor Car Company, Detroit, has resigned to join the forces of the Willys-Overland Company, Toledo. His exact position has not yet been defined, but his work for many years past in England, with the Packard company, the Knox company, and again with Packard, has been of an experimental, research or racing nature.

Ladislas d'Orcy has joined the engineering department of the Aeromarine Engineering and Sales Company of New York.

J. P. Jeejeebhoy, who received his instruction and pilot's certificate here last Fall, is now on duty as a Second-Lieutenant of the Royal Flying Corps in England.

Felix W. Pawlowski, formerly in charge of aeronautics in the University of Michigan, has been appointed by the Secretary of War an aeronautical engineer of the United States Army and shall begin duties in Washington as soon as the present semester ends.

Immense interest is being shown by the residents of Miami, Florida, in the daily flights of Phil Rader, instructor at the Curtiss School.

David Borod, an aviator who has been making trial flights at the New Jersey camp grounds at Sea Girt, flew into a tangle of electric light service wires recently. His plane hung suspended while sparks from the wires he had cut were showered on him.

A Navy Department dispatch reported that Lieutenant Bellinger and Sergeant Crawford, attached to the Pensacola Aviation Station, were painfully but not seriously injured January 8, when aeroplane AH-10 was wrecked in a flight over the bay.

Robert Matter, a son of Philip Matter, president of the Marion State Bank, Marion, Ind., has received orders to proceed within a few hours to Miami, Fla., where he will enter the United States aviation instruction camp. Matter served nearly a year in the American Ambulance Corps in France. He sought to enter the French Aviation Corps, but was too heavy and was rejected. Since returning to America he has been undergoing strenuous physical training and has reduced his weight.

Showing the Housing of the Hall Scott Motor in the Martin Tractor of the Type Used for Instruction Purposes at the San Diego Flying School of the U. S. Army.

S. A. E. BANQUET EXUDES AERONAUTICS ENTHUSIASM

Nothing else possibly outside of the Automobile Show took so much of the automobile's men time as aeronautics during the New York show week. The most important paper presented to the engineers at their professional session was that on "Aeroplane Construction" prepared by Captains Clarke and Dodd, which we are reprinting elsewhere.

At the executive meeting of the S. A. E., Mr. Howard E. Coffin pointed out the tremendous possibilities of aeronautics, and explained why it was reasonable to believe that $50,000,000 would be spent in aeronautics in this country during the next year. It is also gathered from prominent Canadians visiting the show that Canada will spend $80,000,000 in aeronautics during 1917.

It was to be expected that the aeronautic atmosphere would be strong at the S. A. E. annual banquet held at the Hotel Biltmore.

Mr. Russell Huff, the president of the society was chairman, and the following were prominent:

Henry G. McComb, Meetings Committee; Elmer Thompson, Secretary, Automobile Club of America; Dr. S. W. Stratton, Director Bureau of Standards; R. H. Combs, Vice-President S. A. E.; Henry R. Sutphen, Vice-President, National Association Engine and Boat Manufacturers; Alan R. Hawley, President Aero Club of America; Henry Woodhouse, Governor of the Aero Club of America; George W. Dunham, President-elect S. A. E.; Orville Wright, Hon. John Barrett, Director-General, Pan-American Union; Judge Charles F. Moore, Toastmaster; Charles Clifton, President, National Automobile Chamber of Commerce; Howard E. Coffin, Member Council of National Defense; Lieut. Col. Chauncey B. Baker, Quartermaster Corps, U. S. A.; H. M. Rowe, President, American Automobile Ass'n.; David Beecroft, Meetings Committee; L. M. Bradley, General Manager, Motor and Accessory Manufacturers; Major Azel Ames, Chairman Dinner Committee.

The Hon. John Barrett, Director-General of the Pan-American Union, who recently returned from an extended trip in Europe, during which he visited the war fronts, told of the important part that the automobile and the aeroplane were playing in the conflict. He also enlarged in a most constructive way on the broad policy which our manufacturers should adopt in cultivating the business of the South and Central American Republics. His remarks were followed with tremendous interest and received with cordial applause.

Mr. Howard E. Coffin, former president of the society, and a member of the Council of National Defense spoke most informingly on the work being done by the Council. He pointed out how inventories had been made of all factories and how the information could be utilized in the event of a national crisis.

In the "musical" part of the banquet the aeronautical activites of the society were well taken care, as the following verses will prove:

"HELLO SPEEDERS"
(Tune "Hello 'Frisco")

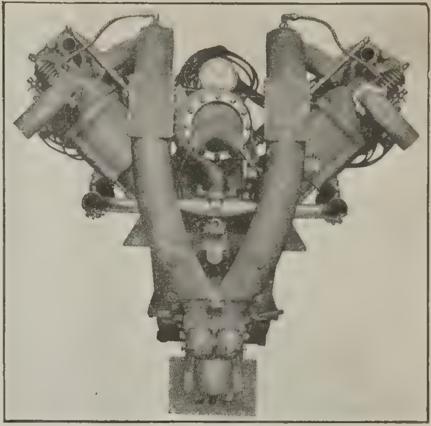
Then there're the men who speed the nation in the air,
Aviators bold, the men who do and dare,
Inventor, flyer, if you inquire,
You find their names known everywhere,
Orville Wright, Glen Curtiss, veterans of the game,
Martin, Sperry, Burgess, Manly are the same,
Moisant, Ely, Niles and Beach,
Flyers all well known to fame.

CHORUS

Hello, speeders, hello! Hello, speeders, hello!
Men most progressive,
Strong and aggressive,
Thanks for automotive power Science owes.
So may your efforts appear,
Bigger and better each year,
Wishing that your aims united be,
That's why they organized the S. A. E.
Fellows, we're here tonight to say Hello!

"CURRENT EVENTS"
(Tune "Coming Thro' the Rye")

If a Hudson meets a Chalmers
On a fair highway,
Does the Hudson say politely,
"Let me by, I pray?"
No, the Hudson just gets busy,
Tries to lead the way,



End View of the New 140 H.P. Sturtevant Aeronautical Engine, Which was Described in Detail in Our Issue of January 8th.

Altho' the Hudson made its records
Down at Sheepshead Bay.

Then the Chalmers, some affrighted,
Starts to twirl her bev's
And she speeds her Hinkley motor
To three thousand rev's.
Now the Hudson, much excited,
Presses to the fore,
And then that bloomin' Hinkley motor
Does four hundred more.

At this juncture, just above them
Sped an areoplane,
And the speed at which it traveled
Made their race look vain.
Cries came from this battle cruiser,
Enemy, ahoy!
And in the plane with rifle raised
Was Mr. Henry Joy.

From a cross road, speeding madly,
Came an armored truck,
Andy Riker drove the demon
But with rotten luck.
Both the racers struck it squarely,
Hit with lots of pep,
And all the moral of this story
Is to "Watch your Step."

Chicago News

By Arthur E. Nealy

The United States Aviation Station, Chicago, Ill., will shortly remove to Memphis, Tenn., where work of training applicants for a commission in the Aviation Section, Signal Officers' Reserve Corps, will continue. Captain Joseph C. Morrow, commanding; Captain Christie and the entire Chicago force will travel South with the school. Ten of the applicants for the reserve commission will also accompany the training school; others will report later. Civilian Flying Instructors Victor Vernon, Theodore C. Macauley, A. E. Johnson, J. D. Hill; Student Instructors Harry B. Crewdson, W. H. Couch, Frederick A. Hoover, E. M. Laird, Charles M. Pond, Terah T. Maroney, Lester E. Holt and Baxter Adams and the rest of the personnel will also accompany the station to Memphis.

Personal Pars

J. Guy Gilpatric, the well-known and efficient aviator, whose views on practical flying problems are familiar to our readers, has become associated with the Federal Advertising Agency. With the conscientious application of his varied abilities, in the excellent spirit which has always characterized his aeronautical work, we expect for him a successful career in the next most progressive profession to aeronautics—advertising.

Overton W. Bounds is now with the Standard Aero Corporation of New York and will do all of the air testing for that company.

Standard Welding and Perfection Spring Companies Combine

A merger has been effected of the Standard Welding Company and the Perfection Spring Company, both of Cleveland, under the name of the Standard Parts Company. The factory facilities and number of employes of both concerns will be doubled during the next eight months. It is expected that other parts companies will be taken in later, and the capital stock will consist of $5,000,000 preferred and an equal amount of common.

Personal Pars

With the passing for their certificates of three students in one morning on January 5th, by Guy T. Slaughter, Observer for the International Aeronautical Federation on the Christofferson Field, near San Francisco, the list of forty students graduated by Instructor Frank Bryant in one year at Redwood City was completed. In addition to these activities at the plant on the shores of San Francisco Bay public interest is centered on the report soon to be made by the inspection boards of the Army and Navy on the establishment of an Army aviation school and Navy aero base on the Pacific Coast. It is extremely probable that Redwood City will be selected for both sites.

Mr. Slaughter, who is a member of the Aero Club of America and vice-president of the Pacific Aero Club, made a recent visit of inspection to the Redwood City site, and in a report made to the officers charged with the work gave it as his opinion that the shore of San Francisco Bay at this point offered possibly the finest site in the United States for the establishment of an aviation school. Owing to the favorable location near a large city, the climatic conditions which allow three hundred and sixty-five flying days a year and the advantage of having a perfect field bordering on the landlocked bay, it is predicted that but a few years will pass before the entire length of the shore in this vicinity will be occupied by aviation plants.

Curious as it may seem there are but few cities in the United States better prepared than San Francisco to furnish aeronautical supplies, and the great libraries of the Leland Stanford University and the University of California, near by, are available to the student and the technical expert.

Army Airmen Lost in Flight in Mexico

According to a message received January 4 at Western Division Army Headquarters from Calexico, the flight of the aeroplane containing Lieut. Col. Harry G. Bishop and Lieutenant W. A. Robertson, Jr., missing from San Diego since last Wednesday, has been traced to a point about fifty miles south of Calexico, but no information was available as to the officers' actual whereabouts.

The message was from Colonel Wilber E. Wilder, commanding at Calexico, to Captain George C. Marshall, aid to Major Gen. J. Franklin Bell, and said:

"The course of the lost aviators, by reports from independent and other sources, has been practically traced from Campo to a point fifty miles or more south of Calexico. The machine was seen in flight by Americans, Mexicans, Chinese, and Indians. They confirm all other reports. No one pretends to have seen it north of the line unless at Campo earlier in the morning, when it was near the line.

"Near Jacumba it was south of the line. Latest reports state that an Indian named Frank Leon, saw the machine turn southwestward, south of Sierra Mayor, at the southern end of OOcopah Mountain, which would take it over the south end of Laguna Salada, where there is a bare, level spot twenty miles long and six miles wide, and which is now dry.

"General Bell, commander of the Western Department, left tonight for the Northwest. His instructions to Colonel Wilder are to "find the men."

Ruth Law Goes to Europe to Study Air Fighting

Miss Ruth Law, the holder of the American distance record for continued flight of 590 miles, made on her recent aeroplane trip from Chicago to this city, has sailed for Europe. For a number of years she has spent her winters in Florida, where she has conducted an aviation school in Miami, but this year, because of her desire to investigate European aeronautics, she decided to spend the next six or eight weeks in England and France.

"I have heard so much about the great progress made in aeronautics over there," she said, "that I am going to see just what they can teach us. I have heard of their scout machines making from 140 to 150 miles an hour, when the best we have over here only do about 100, and I want to see them do it. Then they claim to have developed their battleplanes and other fighting machines to where flying upside down is quite a usual thing. I want to see them do this, also."

CONSTRUCTION and OPERATION
OF
KITE BALLOONS

By RALPH H. UPSON

It is a fact, acknowledged by the military authorities of the warring nations, that no other single factor is so powerful in the war as the effectiveness of the combination of artillery aided by aeroplanes and kite balloons. The daily reports of the military authorities contain brief mentions of the extraordinary work done by artillery aided by aircraft, and the one aim of both sides at present is to attempt to destroy the air auxiliaries of the enemy's artillery.

Correspondents who visit the different battle fronts tell of seeing as many as forty kite balloons within their range of vision at a single period. The kite balloons are the eyes of the artillery, the observation posts, which, located a few miles in the rear of the fighting lines, enable the observers to sweep the extended horizon and watch the fleet of artillery fire and the movements of the enemy, thereafter transferring the information to their field batteries.

A few days ago, in a report of his visit to the front, Mr. H. G. Wells in analyzing the factors, said: "I visited some French guns during the tir de demolition phase. I counted nine aeroplanes and twenty-six kite balloons in the air at the same time. There was nothing German visible in the air at all." The United States Army and Navy have at present only one kite balloon in commission and half a dozen ordered. There are seventy-three forts and forty-five field artillery batteries in connection with our land and coast defenses and fifteen naval districts of the entire fleet to be equipped with kite balloons. In other words, hundreds of millions of dollars' worth of defenses are blind, as it were, owing to the lack of aerial eyes, so that the territory which they should protect, would be at the mercy of the long range guns, of vessels lying beyond the point of vision of the artillery observers stationed in the forts of the fleet.

As so little is known in this country about the operation and use of kite balloons, the articles which AERIAL AGE *has arranged to publish will disseminate information concerning the operation and value of kite balloons which will be of great usefulness to our military service.*—[EDITOR.]

(*Continued from page* 365)

Pulling Down

1. If the wind is strong and has changed abruptly in direction it is best to move the ground cloth and stakes to correspond. All men at their posts (air position), follow the ropes wherever they go and seize them near the end when the command is given.

2. The main principle in holding the balloon and basket at first is to dampen or check the lateral movement, but not to absolutely prevent it. The men should move slowly with the balloon and keep it headed into the average wind. The cable is reeled in fact until the basket is about 10 feet from the ground. Then wait till the basket has stopped swinging before bringing it to the ground.

3. The basket man grasps the basket firmly as soon as the top edge comes wthin reach (without command). If it is merely wished to change passengers, ascension is made again immediately without pulling down further.

4. For putting in gas or anchoring, however, men take ground position, a signal is given to the engine and the cable is reeled in. The ropes in the meantime are pulled in correspondingly. The chief of section or corporal must signal the engine driver to stop while there is still 10 ft. clearance of cable. *Great care must be taken in this not to run too far and break the cable.*

5. When the men at either post 4 or 6 get within reach of their own screw stake the rope is given one complete turn through the eye and held until the opposite grasp can be attached. The chief of each group then pulls out the slack while all others pull down from above the ring. All pull down as rapidly as possible, unless one side or the other is ordered to slow up to get the balloon level. If there are not enough men to pull it all the way down at once, tie the ropes to prevent them from slipping, then concentrate all the men in succession on each rope until the balloon is down within reach. Then hook sand bags into the suspension and if necessary tie the concentration rings to stakes. Disconnect the fins at the bottom and furl them up. See that the main cable has one or two feet of slack in it. The balloon is now in a position to receive gas and it can be left this way in a light wind.

6. If the balloon sways around much it must be brought flat and tight onto the ground where it catches the wind less and is also less readily seen from above. Plenty of sand bags should be hooked high into the suspension (two in each patch or in the splice below). If left in a strong wind the end of the rip cord should be brought out and tied with plenty of slack to one of the stakes. It is always worth while to cover the balloon if it is to be left anchored for any appreciable time. Emergency anchor straps may then be thrown over cover and all.

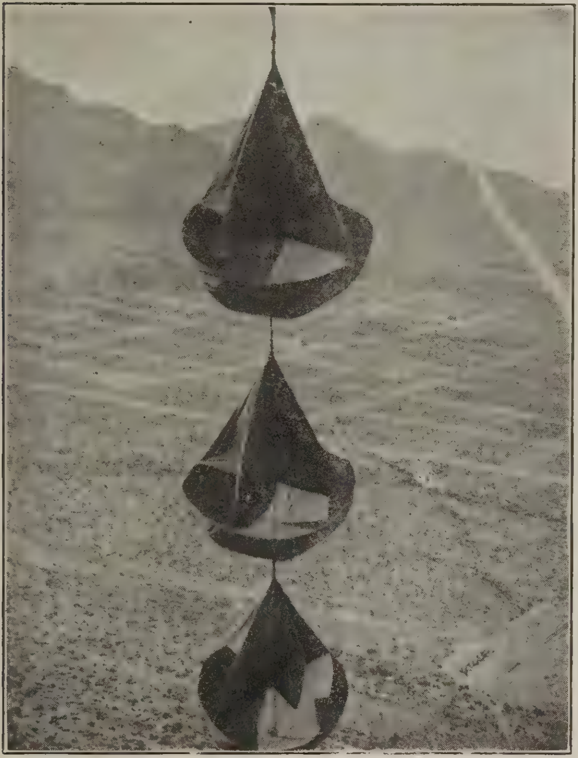
Transporting a kite balloon to the location from which it is to be ascended.

Observation

1. It is not the purpose here to go into the details of observation: We will assume the following fundamentals:

The target can be seen from the balloon.
The balloon can be seen from the gun.

2. The observer in the balloon takes:
   (a) The height above ground by barometer.
   (b) The distance and direction of target (by position finder).
   (c) Correction data on subsequent firing.
3. The observer at the gun takes:
   (a) The distance and direction of balloon (by balloon sight).
   (b) The final corrected firing data. (by mechanical plotter).
4. Observer at the base of cable takes:
   (a) Zero barometer reading.
   (b) Correcting, for windage and temperature.



Detail view of the tail cups shown diagrammatically in Fig. 2.

5. All data should be taken as near simultaneously as possible. Whenever there is time, at least one check reading should be taken, and more than that if the height of the balloon has substantially changed. A height reading is taken before and after each set of position readings.

6. For transmission of data from the balloon a combination wireless telephone and telegraph is immensely superior to ordinary telephone for all altitudes. Written messages and diagrams may be sent down the cable by means of a simple carrier device that can be readily installed.

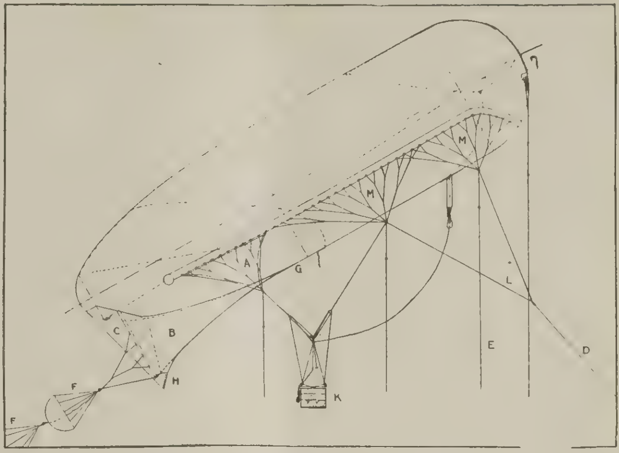


FIG. 2—OUTSTANDING FEATURES OF MODERN KITE BALLOONS.
A—Fins; B—Keel; C—Funnel; D—Holding Cable; E—Maneuvering Ropes; F—Tail Cups; G—Appendix; H—Air Entrance Valve; J—Gas Valve; K—Basket; L—Main Bridle; M—Suspension Groups.

7. If it is required to make quantitative observations in a very strong wind, some form of wind shield is desirable, and for very cold weather an enclosure for the entire car and some form of heater. There should always be a means of quick exit, however.

8. If the balloon is full watch the gas pressure during any considerable influence. (See Par. f. under "Ascension.")

9. Whenever the wind exceeds 40 miles per hour, the balloon should be watched carefully and brought down as soon as reasonably possible. It is not necessary to always carry an anemometer, however, as it is possible with experience to judge the wind quite closely. If the balloon is tilting to a considerable angle the tension of the cable can be relieved by shifting the basket forward. This is especially applicable when descending from a great height.

10. It is best policy for the observer to wear his safety belt constantly so that he can jump into the parachute and jump at a moment's notice. When nearing the ground in a parachute drop, it is best to detach the parachute from the safety belt again. One can then let go immediately on striking the ground, and roll over unimpeded.

Use as Free Balloon

1. The ordinary position of the appendix in the air is shown by the dotted lines in Fig. B (balloon captive).

2. If the balloon breaks away and it is wished to stay with it, the first thing to do is to pull open the appendix by pulling on the rip-cord. This is one step further than is shown by the full lines in Fig. 1. There are then 3 more safety cords on the inside which guard against accidentally pulling open the rip panel. At the same time break the string on the valve cord gland and pull the valve open *hard*. (A man's entire might on the valve cord is not too much.) Hold it open until the balloon just starts down.

3. When nearing the ground check the descent if necessary by throwing out the ballast and dispensable equipment. Break the remaining safety strings on the rip-cord. Pull out the rip-panel all the way when about 50 feet from the ground.

(*Continued on page* 491)

The ascension ground as viewed by the observer in the basket of the kite balloon

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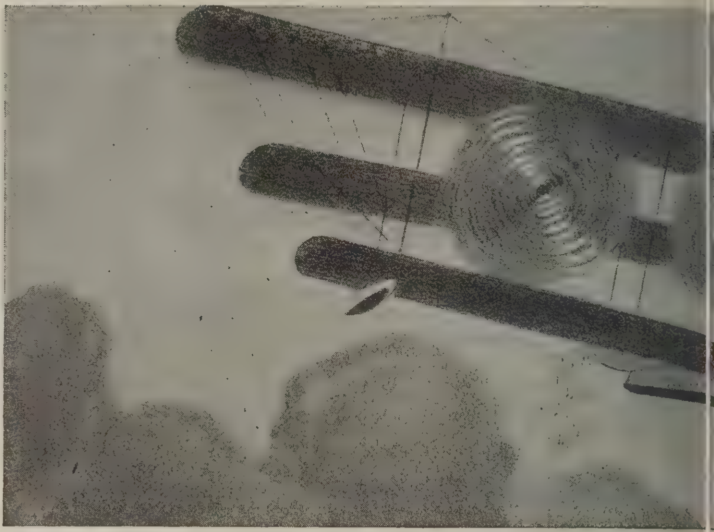
The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos-Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.



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THE PROBLEMS OF AERONAUTICS

By COL. GEORGE O. SQUIER, United States Army

Excerpts from a Paper Presented at the Franklin Institute, Philadelphia

THE following are some present problems connected with the development of military aviation and aerostation.

I. AERODYNAMICS.

(*a*) Continue the development of the mathematical theory to explain the aerodynamic phenomena recorded in the aerodynamical laboratories, and to forecast further results.

(*b*) Obtain solutions for the speed and direction of flow of air about geometric and aerotechnic forms, and develop experimental means to visualize or map the speed and direction of flow.

(*c*) Map the currents of the upper atmosphere which may be of most use in aerial navigation, and evolve simple practical rules for the guidance of pilots.

(*d*) Give fuller explanation of the phenomena of soaring, i. e., airplaning indefinitely without motive power.

(*e*) Develop equations and laws of comparison by which the behavior of large aircraft may be more accurately foretold from tests of models. Apply further the principle of dynamical similarity.

(*f*) Investigate more direct and effective methods of securing a lift or thrust in the air from the consumption of fuel.

(*g*) Complete theory of the air screw.

II. ENGINE PROBLEMS REQUIRING RESEARCH.

(*a*) *Fuel.*—Possibly the most far-reaching problem is fuel. A fuel that will carry more power into an engine per unit volume will be a direct gain.

Attempts have been made to combine alcohol, gasoline, acetylene, picric acid, ether, and other hydrocarbons with the above object in view. Questionable results have followed. There has been an increase of power, but nothing so far commercially or practically useful.

This question must be studied with the greatest of care and from a truly research standpoint.

(*b*) *Solid fuel.*—Solid fuels that can be converted into liquid in small quantities just prior to use, are desirable for military aviation. In case of accident from shot or shock, leakage of liquid fuel is a danger. Solid fuel could be carried in quantity with less danger.

(*c*) *Engine cooling.*—The problem of radiation is important. If some substance could be found that would circulate through the cooling system, at higher temperatures than water, it is probable that greater engine efficiencies would result. Oils, salt waters, and other materials have been tried with indifferent success.

(*d*) *Liquid fuel pipes.*—Tubing that will resist vibration (causing rupture) is desired. An oil and gasoline proof rubber tubing is reported as used in Europe. This development is highly important, not only for tubing, but for containers in which to carry liquid fuel. Some sort of fabric and rubber tank that would really resist the action of gasoline would be of the highest benefit.

A difficulty lies in the fact that the tanks are large (say 20 to 100 gallon capacity). The structural problems would be serious. The tanks now used are large and of metal. Vibration causes much difficulty and leakage.

(*e*) *Metal coating.*—The protecting of the metal parts of an air plane, especially the fittings and cables, is a serious problem. A material is desired that would really prevent dangerous corrosion. Nickel plating over copper is very good, but will not suffice. Rust strikes through very rapidly. Baked enamel is the best coating. It is impossible to apply in many cases.

(*f*) *Sound.*—The question of eliminating the noises involved in the operation of aircraft is one of importance. The peculiar note of the propeller of a Zeppelin can be heard for several miles, and is usually the first warning of its approach at night.

III. MISCELLANEOUS.

(*a*) *Physiological.*—Study the physiological and psychological effects of low density air at high altitudes on the performance of pilots.

(*b*) *Transparent wing covering for aeroplanes.*—A wing covering which would answer the following general requirements would be of great value to military aviation:

Weight, not more than 5 ounces per square yard.

It should present reasonably great resistance to flame.

It should be reasonably proof against action of salt water, moist air, extreme dryness, and quick temperature changes.

It should not stretch in any direction. Its ability to retain original form as placed on the aeroplane is very important.

It should have tensile strength of at least 75 pounds per inch width in any direction.

Its tendency to tear and split because of tack holes through it, or because of bullet holes, should be as small as possible.

(*c*) *Development of light alloys for aeroplane construction.*—Pure aluminum or aluminum alloys. It is believed that a great deal can be done in this direction. So far no alloy has been developed, except possibly in Germany, which can compare with average Alaskan spruce in its "specific tenacity."

(*d*) *The structure of gusts.*—It is believed that this is of sufficient importance to aviation to warrant considerable expense in its study.

Painstaking investigation of the character of eddy formations caused when wind strikes trees, hollows, cliffs, etc., and the character of disturbances created by canyons, swamps, deserts, etc., would be of great value to aviators.

This can be done not only by smoke and toy balloon work in the vicinity of obstructions such as the above, but also by photographic work in wind channels.

A set of simple rules laying down just what the aviator may expect on one side or another of canyons, cities, trees, lakes, and swamps would be very helpful in aviation.

(*e*) *Radio apparatus for aircraft.*—The subject of radiointercomunication between aircraft in flight and between aircraft and the earth requires for its solution the highest possible efficiency and reliability combined with minimum weight.

A present tendency is to entirely separate the power plant from the main engine of an aircraft. The generator body in this case has a stream-line figure and a separate small air screw is provided. Among other methods the oscillion is being tried as the actual source of continuous electromagnetic waves.

(*f*) *Bullet-proof gasoline tanks.*—Development of a material with which to line or construct tanks to contain the gasoline in an aeroplane in which a bullet hole will quickly close entirely, or partly at least. This would enable many a flier to get back to his own lines after having been fired upon.

(*g*) *Develpoment of a fabric as good as, or better than, Irish linen for the covering of aeroplanes.*—There has not been manufactured in this country a fabric suitable for use in covering airplanes.

The fabric should answer all requirements laid down under transparent wing covering, and be, in addition, such as to shrink the proper amount without harm when cellulose solution is applied.

It is possible that long-fibre cotton might be developed that would answer the purpose.

We must become independent in all lines affecting our military aviation. To-day we depend entirely upon Ireland and England for our linen, and the supply is becoming very low in this country.

(*h*) *Aviator's clothing.*—Much is still to be done in devising noninflammable and protective clothing for aviators. This question is intimately connected with personal armor and safety in case of fall.

(*i*) *Ground speed indicator.*—An instrument which would measure the actual speed of an aircraft over the ground would be useful in the operation of military machines.

IV. PHYSICS OF THE AIR.

(*a*) *High frequency.*—At present we have no evidence of vibrations in the air much greater than 40,000 to 60,000 cycles per second, but there is no reason to deny the possibility, nor indeed the probability, of vibrations of 100,000 to 200,000 or even a million cycles per second in the ordinary air we breathe. If these vibrations exist, and it is a wonder if they do not, may not they have an important function to perform in nature? The reason, of course, we do not perceive them is because they are above the upper limit of the human ear, and also do not directly affect any of our other senses.

Electromagnetic waves of these frequencies existed through all time unperceived until Hertz devised a "detector." At present the detector for high-frequency air vibrations is the manometric flame, and it would be of great importance to invent a detector for air vibrations which would indicate their presence or absence up to 500,000 or 1,000,000 per second. If we had such a "detector" and also means for producing such vibrations

(*Continued on page* 491).

FOREIGN NEWS

AUSTRIA

The Italian airdrome near Belgena, destroyed twice before in aerial attacks, was shelled January 12 by Austrian seaplanes, which scored several hits. Of two Austrian machines that attempted an attack against Grado Cervignano, only one returned, the other being shot down.

DENMARK

The Christiania newspaper, *Dagbladet,* on January 9th, announced that Second Lieut. Pollner had given up his intention of flying across the Atlantic in an aeroplane. His original plan (reported in Aerial Age on October 23d) was to start in July.

It was learned that Lieut. Pollner was recently in Germany endeavoring to get plans for a suitable motor to be constructed by a Danish firm, but was unsuccessful in securing the plans, and it became necessary to give up his project for the present.

FRANCE

A German aeroplane on January 13th, was forced to land in the French lines near Pont-à-Mousson. The aviators were made prisoners.

C. C. Johnson, the American aviator, attacked and forced down a German aeroplane on Friday, January 12th, after a thrilling sky duel. Although Johnson's machine gun riddled the German aircraft, forcing the pilot to descend, he is not credited with destroying the machine, as the French observers only count machines positively known to be destroyed or burned.

Lieut. Badora, a military aviator, is dead as a result of injuries received in an accident on the night of January 11th, at the time the false alarm that a Zeppelin was approaching Paris was sounded. While adjusting his helmet the lieutenant took one hand from the steering gear and his machine dipped on one wing. He was too close to the ground to recover his balance and the aeroplane crashed to earth.

Deputy Felix Cabri urges that the municipal authorities of Paris install powerful electric sirens in different parts of the city to warn the population of the approach of Zeppelins. M. Cabri declares that the automobile horn sirens on the fire engines, now used, are not loud enough.

The Midi says the Zeppelin alarm in Paris on Thursday night was sounded by mistake by a military watcher, who believed he heard from a microphone the noise of a Zeppelin's propellers. No Zeppelin crossed the French lines that night.

GERMANY

A Geneva report of January 9th to the London *Daily News,* states that the new Zeppelin L-40, according to the *Neue Zuericher Zeitung,* made a trial flight on January 6th over Lake Constance. The Zeppelin emitted dense gas clouds, with the result that it was invisible during the greater part of the flight. The propellers were almost noiseless and the airship scarcely could be heard. Great activity prevails at the Zeppelin factory.

In a dispatch from Berlin by wireless it is officially announced that German naval aeroplanes on the afternoon of January 7 successfully attacked with bombs the barracks and camp west of La Panne and at Neiuport, Belgium.

Six aeroplanes were lost by the entente forces January 7th on the Franco-Belgian front, German armv headquarters announced.

Near Beaumont on January 11th, German aeroplanes shot down two English captive balloons, which fell down burning.

GREAT BRITAIN

The sinking of a British seaplane carrier is reported in a dispatch received at London, dated January 11th. It reports that H. M. seaplane carrier Ben-My-Chree, commander C. R. Samson, D. S. O., was sunk by gunfire in Kastelorizo Harbor, Asia Minor, January 10th. The only casualties were one officer and four men.

The Ben-My-Chree was a converted merchantman of 2,651 tons gross. She was 375 feet long, was built in Barrow in 1908, and owned by the Isle of Man Steam Packet Company of Douglas.

ITALY

Raiding operations along the Austro-Italian front are reported in a war office statement received at Rome, January 9th, which follows:

"Enemy aeroplanes yesterday attempted several raids on our territory. They were repulsed by our anti-aircraft batteries and pursued by our aviators.

"One of our squadrons successfully bombarded military objectives in Reifemberg, Saint Daniels and Cobdil, in the valley of the Branizza (a confluent of the Vippacho). Escaping from the enemy's anti-aircraft fire and driving back all attacks by hostile aeroplanes, our machines returned safely to their base."

On the night of January 11th, an Austrian air squadron dropped a considerable number of bombs in the neighborhood of Aquieleja, southwest of Monfalcone. Three men were wounded and some material damage was done. One Austrian seaplane was brought down by the Italian anti-aircraft batteries. The aviators were made prisoners. At the same time two Italian aeroplanes bombarded the aviation ground at Propecto and the seaplane base in the harbor of Trieste. Escaping from the heavy fire of the Austrian anti-aircraft batteries they both returned safely.

RUSSIA

On January 11th, in the region of the village of Minitche (on the Shara), south of the Slutzky highroad, a Russian aviator hit an enemy aeroplane, which fell into the enemy's lines.

During the evening of the 10th, several squadrons of German aeroplanes dropped bombs on Lutsk.

On January 13th, a German aerial squadron consisting of thirteen aeroplanes dropped about forty bombs on the station and town of Radzivilov. Russian aeroplanes have made reconnoissances behind the enemy, descended to about 1,400 meters and bombarded with machine gun fire the enemy's battery near the village of Krukhov, twenty versts east of Zolotchev.

Description of the Newest Zeppelin

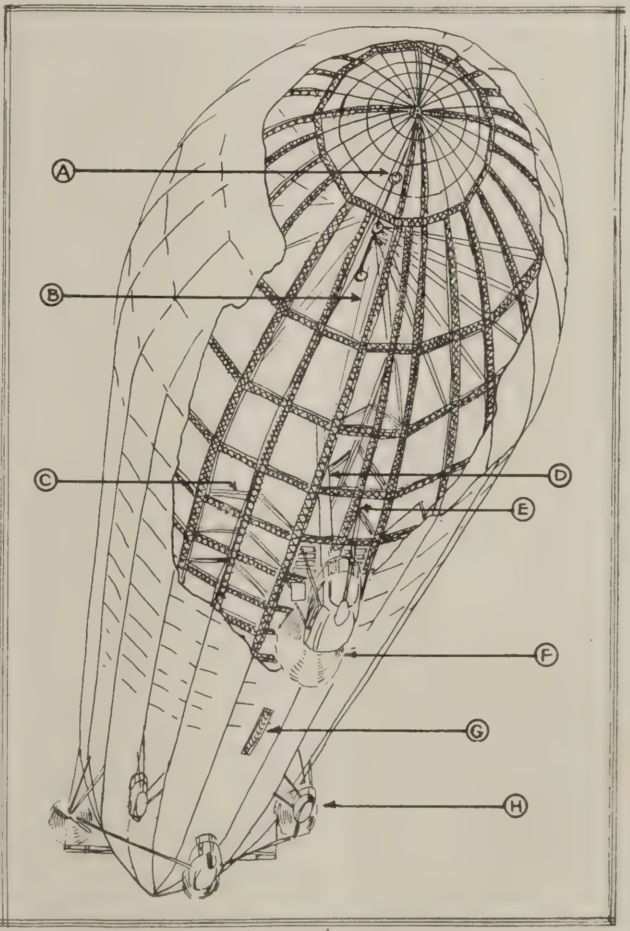
The Engineering Supplement of the London *Times* gives the following interesting data concerning the Zeppelin brought down in Essex recently

From 650 feet to 680 feet in length, and measuring 72 feet across its largest diameter, the vessel was of stream-line form, with a blunt rounded nose and a tail that tapered off to a sharp point. The framework was made up of a series of longitudinal lattice-work girders, connected together at intervals by circumferential lattice-work ties, all made of an aluminium alloy resembling duralumin. The whole was braced together and stiffened by a system of wires, arrangements being provided by which they could be tightened up when required. The weight of the framework is reckoned to be about nine tons, or barely a fifth of the total of fifty tons attributed to the airship complete with engines, fuel, guns and crew. There were twenty-four ballonets arranged within the framework, and the hydrogen capacity was 2,000,000 cubic feet.

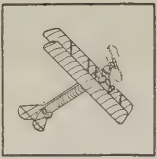
A cat-walk, an arched passage with a footway nine inches wide, running along the keel, enabled the crew, which consisted of twenty-two men, to move about the ship and get from one gondola to another. This footway was covered with wood, a material which, however, was evidently avoided as much as possible in the construction of the ship. The gondolas, made of aluminum alloy, were four in number; one was placed forward on the center line, two were amidships one on each side, and the fourth was aft, again on the center line.

The vessel was propelled—at a speed, it is thought, of about sixty miles an hour in still air—by means of six Maybach-Mercédès gasoline engines of 240 horse-power each, or 1,440 horse-power in all. Each had six vertical cylinders with overhead valves and water cooling, and weighed about 1,000 pounds. They were connected each to a propeller shaft through a clutch and change-speed gear, and also to a dynamo used either for lighting or for furnishing power to the wireless installation. One of these engines with its propeller was placed at the back of the large forward gondola; two were in the amidships gondolas, and three were in the aft gondola. In the last case one of the propellers was in the center line of the ship, and the shafts of the other two were stayed out, one on either side. With the object of minimizing air-resistance the stays were provided with a light but strong casing of two or three ply wood, shaped to stream-line form. The propeller shafts were carried in ball bearings. The gasoline tanks had a capacity of 2,000 gallons, and the date, July 14th, 1916, was marked on one of them, is thought to indicate the date of the launching or commissioning of the vessel.

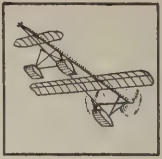
Forward of the engine room of the forward gondola, but separated from it by a small air space, was first the wireless operator's cabin and then the commander's room. The latter was the navigating platform, and in it were concentrated the controls of the elevators and rudder at the stern, the arrangements for equalizing the levels in the gasoline and water tanks, the engine room telegraphs, and the switchboard of the electrical gear for releasing the bombs. Provision was made for carrying sixty of the latter in a compartment amidships, and there was a sliding shutter, worked from the commander's cabin, which was withdrawn to allow them to fall freely. Nine machine guns were carried. Two of these, of 0.5-inch bore, were mounted on the top of the vessel, and six, of smaller calibre, were placed in the gondolas—two in the forward, one each in the amidships ones, and two in the aft one. The ninth was carried in the tail.



A—Central Hawser. B—Web of Wire. C—King Post Girders. D—Ladder to Gun Platform. E—Footway. F—Propeller. G—Bombs. H—Side Gondolas.



MODEL NEWS



Edited by G. A. Cavanagh and Harry Schultz

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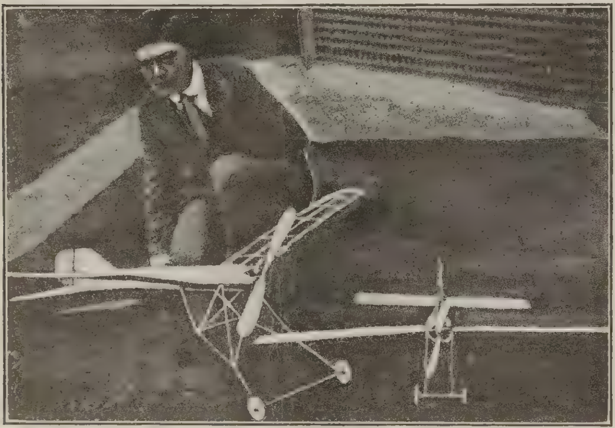
With but One Arm, Fred. W. Glatt, of Utica, New York, Builds and Flies Model Aeroplanes

Fred W. Glatt, 17 years old, who has only one arm, built and flew the two models shown in the accompanying photograph. As may be seen both possess the appearance of good flying models. The framework of the larger model consists of steel wire, the power being derived from an imported compressed air power plant. The smaller model, however, is chiefly constructed from wood and for motive power the ordinary rubber strand is used.



The larger machine is four and one-half feet long and four feet from tip to tip of the planes, weighing but 14 ounces; it is a marvel of strength and beauty. After having constructed the model he purchased the tank, formed of wound strips of aluminum, the compressed air motor, and had them imported from Bulgaria. The propellers he also purchased.

It is well understood among model flyers that to build a model of this type it requires no little skill for one with two hands, especially in the matter of constructing compressed air driven models. Although the machine has received some severe tests it has stood up well, which demonstrates the quality of work which has been put into it. A glance at the framework under the machine shows the cleverness of the bridge-building. The framework is of thin steel wire, and unless constructed so that each piece is supported by another would stand up as well as necessary. As it is the framework is so constructed as to allow the model to be forced to the ground after which it will spring back to its original position as strong as ever.

The frames of the wings are made from strong steel wire and covered with Sephr skin, the lightest known covering to model builders.

The compressed air motor is of 1-25th horse power and the tank when compressed with air will withstand a pressure of 180 lbs. per square inch; enough pressure to enable the model to fly for quite some distance.

Considerable skill was executed by Mr. Glatt when he assembled the various parts of this model for to make an aluminum and steel aeroplane requiring the use of solder calls for no little dexterity and skill with tools, but to do so with the use of only one arm makes Mr. Glatt's work the more unusual.

The small machine is built up of wood, the motive power consisting of rubber strands which are located within the body. This machine will show up well under favorable conditions.

A Petrol Engine

THE Bonn-Mayer Petrol Engine is one specially designed for models, and in its tests has proved to be very successful. The engine is of the 2-cylinder V-type, its weight complete in running order, including a 3 ft. 4 in. propeller, a certain amount of fuel, ignition coil, etc., is only 11 lbs. 2 ozs. The engine by itself weighs 7 lbs. With the propeller, of which the dimensions are given above, and of 2 ft. pitch, a speed of 1,200 r.p.m. has been attained, with a thrust of 14 lbs. Greater power is expected when a few small alterations have been made. A complete description of this engine appears in "Model Aeroplanes and Their Motors."

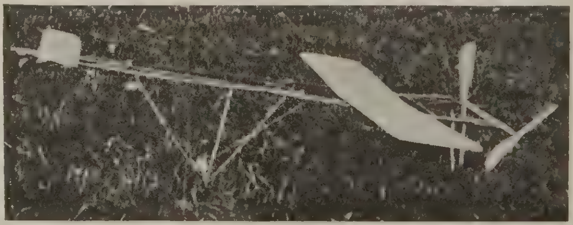
The Pease R. O. G. Model

This model is one of the most successful flown in Chicago during the last season. It has made about six flights of over one hundred seconds, although it does not hold the American record because it was not flown to its best advantage until late in the season. It is 40″ long with spruce fusilage members 5/16″ x ⅛″ at the middle, tapering to ¼″ x ⅛″ at each end. They are bound together at the front with silk thread and glue over the front rubber hook. The rear ends are spread 12″ by means of a bamboo crosspiece 1/16″ x 3/16″ and braces 1/16″ x ⅛″ streamlined. The bearings are hammered out of iron wire and drilled for the propellor shafts. The middle X strut is of 1/32″ x ⅛″ bamboo and the single front strut is 1/32″ x 3/16″.

The landing gear consists of two uprights of bamboo 1/16″ x ⅛″ with a bamboo axle 1/16″ in diameter. Cork disc wheels are used. The tail skid and its braces are made of 1/16″ round bamboo.

The main wing is built up with front and rear spars of spruce, streamlined on the under side, with a maximum cross section of ¼″ x ⅛″ at the middle tapering toward the tips. The ribs and wing tips are of bamboo; ribs, 1/16″ x 3/32″; tips, 1/16″ x ⅛″. The elevator has bamboo edges 1/16″ x ⅛″ and light bamboo ribs. Both wings are single covered with tissue paper and "doped" with banana oil.

The 12″ white pine propellers are carved from blocks ⅝″ x 1½″ at the ends and have a pitch of 15.2″. They are finished with one coat of white shellac and equipped with shafts of 13 gauge piano wire. Six strands of 3/16″ or 9 strands of ⅛″ flat rubber are required to fly this model which weighs 3¾″ ounces complete.



Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested

The Accordionplane

Invented by the perpetrators of the ODOR-ENGINE, and guaranteed under the Food and Drugs Act of 55 B. C. (British Columbia). All stock non-paid and acceptable if accessible. Patents protected in Brooklyn and all foreign countries. Please omit flowers.

Our staff of expert engineers, greatly encouraged by the instant success of the ODOR-ENGINE in the aeronautical world, has decided that if such an imposition on the public could be brought forth, there is no reason on earth why we could not supply an aeroplane for the thing to run. But right here we will admit that although in the matter of designing engines our engineers are *ne-plus-ultra*, when it comes to aeroplanes they are *non-compis-mentis*. (The foregoing means something we know, but we never quite understood legal phraseology, and hope that the words are used in a correct sense.)

Realizing the fact that they were stumped when it came to designing aeroplanes, our head swindler—er—that is—head designer went down to the Grand Central Station and selecting a car marked San Francisco, climbed in. (He was thrown out a couple of times by the brakeman, but he was a persistent cuss and reached the west after traveling 21 days.)

Arriving in San Francisco, he at once combed the country for a designer, and in the course of the combing had several hair's breadth escapes from sheriffs, landladies, etc. After a few weeks' wanderings he fastened his talons on a promising young engineer, who had been making promises for so long that his landlady would no longer trust him and he was forced to work.

He was offered a fabulous salary (*fabulous* from *fable*, meaning *mythical*) and with tears of gratitude he accepted, and borrowed a quarter from our designer.

Upon affixing his name to our contract he made the following speech:

"I am very glad to have the opportunity of working for the ODOR-ENGINE Company, for I feel sure that when people judge my work with the standards of the ODOR-ENGINE Company, they will admit that I am a wonderful engineer."

We have not quite reasoned out that remark yet, and suspect that he is casting aspersions on us, but will let it go for the present.

After our new engineer had signed the papers (and the pledge for the new year), we brought him east to our factory, and giving him some tools of the finest quality we told him to go ahead and design the best aeroplane in the world. Above all, we warned him that this machine of ours must be absolutely original, and must embody features never before seen in any aeroplane. And we are sure that he has succeeded. Of course, the machine may not fly, but that may be the most original thing about it. Almost anyone can build a machine that will fly. The following is the general description:

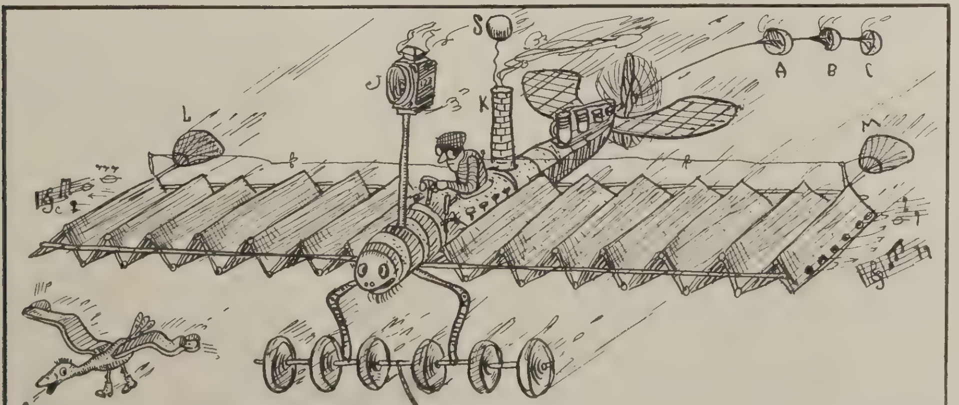
We gave our machine the name ACCORDIONPLANE because of its special wings, which fold like an accordion. (Need we mention that we have used only piano-wire in its construction?) The folding wing feature is a great advance in science, as we have installed a number of reeds in the cloth which give out musical sounds when the wings are folded. These musical sounds are used to signal those on earth. An ingenious hand lever permits the wings to be folded and unfolded very rapidly, and above all, our pilot must be a musician to succeed on our machine. For instance, after he has broken the world's altitude record, he comes down, and by the operation of the lever plays, "Hail, the conquering hero comes." This serves as a notice to our press-agent on the ground, who at once places a full-page advertisement in all the papers. (Of course, we have not the money to pay, but that is a different matter.)

Attention is directed to the balloonets A, B, and C. These are used, of course, for stability. It strikes us as nothing short of marvelous that no one has thought of such a simple device before. It will be noted that our aeroplane has six wheels. We have noticed that all locomotives have a great number of wheels, and we believe that in some mysterious way more strength is obtained by their use.

In addition, landing is much easier in this way.

Rope D is very important. If the machine starts to fall, the pilot simply climbs out of the seat and slides down the rope. Just imagine how many lives would have been saved to science if someone had thought of such a simple device before! After exhaustive tests, we have decided on the use of fans for ailerons, because they are inexpensive and can be easily replaced. (Figures L, and M, in the drawing.) The brick chimney K is another radical departure. In all other aeroplanes, the designers have used iron pipe for exhaust. Why they have done this, we do not know, but no matter where you go, you will find that the general practice (excepting in aeronautics) is to use brick for chimneys, so we have decided to break away from convention.

The headlight J is, of course, for night flying, and is the best headlight that we were able to find on an unguarded freight train.



The small spherical ballon S is another new departure. There is a string on the end of it, attached to a small piece of cork, which extends down the exhaust K right plumb into the gasoline tank. Naturally the cork would float on the gasoline and would tend to go down as the gasoline became used up. However, the balloon counteracts this effect, with the result that no matter how low the gasoline may go in the tank, the pilot does not know it, and therefore will not lose his nerve when attempting a great flight.

It will be noted, perhaps, that our aeroplane is rather artistic in design. The drawing was made by Hashimura Togo, and the young man's artistic talent insisted on cropping out.

Thoroughness is the distinguishing element in the making of a Hess-Bright Ball Bearing. Can you imagine an entire organization keyed up to that close attention to detail, that "infinite capacity for taking pains" which some one has said is the true cause of genius?

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The February issue of MoToR BoatinG will contain an intensely interesting article on the need of flying boats as an adjunct to military preparedness. Written by Rear Admiral Robert E. Peary, discoverer of the North Pole, it constitutes an authoritative message on this very important subject.

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113,309,285 Persons Now Under Stars and Stripes—National Wealth Approximately $800,000,000,000

The Census Bureau estimates the population on January 1, 1917, as follows:

Continental United States	102,826,309
Outlying possessions	10,482,976
Total	113,309,285

This is an increase of 2,100,970 since January 1, 1916, the Bureau says. The estimates of the chief States are:

	Jan. 1, 1917	Jan. 1, 1916
New York	10,366,778	10,273,375
Pennsylvania	8,591,029	8,522,017
Illinois	6,193,626	6,152,257
Ohio	5,181,220	5,150,356
Texas	4,472,494	4,429,566
Massachusetts	3,747,564	3,719,156
Missouri	3,420,143	3,410,692
Michigan	3,074,560	3,054,854

The estimate for New Jersey is 2,981,105; for Connecticut, 1,254,926; the Philippines, 8,879,999, and Porto Rico, 1,223,981.

The national wealth is approximately $800,000,000,000. And we have about 20,000,000 men of military age—and enormous industries. What we need is universal training, coordination of efforts, mobilization of the industries, a navy equal to the best, and 2,000 aviators. With these we could sleep peacefully at night and feel that this country is secure against emergencies.

(*Continued from page* 483)

4. The above operations cannot be handled properly without some previous free balloon experience.

5. There are no extra instruments required, but a short piece of very light silk ribbon will be found convenient for gauging the vertical motion through the air.

(*To be Continued*)

(*Continued from page* 486)

in air, it would be possible to provide a system of intercommunication, over short distances at least, based upon ultra-audible sound waves. We could, for instance, devise a noiseless fog-horn as an aid to navigation.

(*b*) *Elasticity.*—The elasticity of the air has been made to serve in a great variety of machines to perform useful work. The original dynamite gun of Zalinski utilized the elasticity of compressed air as the explosive for propelling the projectile.

The best condensers for radio-telegraphy employ air as the dielectric. Any break-down automatically repairs itself and thus adds greatly to reliability.

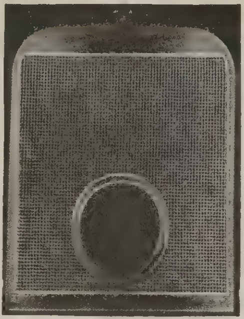
The passenger automobile itself has been made possible by the development of the pneumatic tire.

(*c*) *Friction.*—The magnitude of the friction of the air against the surface of bodies moving through it may absorb large amounts of energy. The average velocity of shooting stars is 25 miles per second. They vary from 10 to 30 miles a second. The earth's orbital velocity is about 19 miles a second. It is sometimes added and sometimes subtracted from the shooting star's velocity according to the way the body enters the atmosphere. The friction of the air at these velocities is so great as to volatilize metals.

A mass of 1 gram of air moving with this velocity, 25 miles per second, has a kinetic energy of 8.0937 by 10^{12} ergs, which is sufficient to lift 1 ton of matter (2,000 pounds) to a height of 298 feet above the earth's surface. One gram is a small piece of matter to possess this potentiality. This enables us to comprehend, in part at any rate, the disastrous results of the cyclone, where houses and forests are bodily cut down as by a giant steel knife.

(*d*) *Mass.*—A cubic foot of air at 0° C. and ·76 cms. pressure weighs 0.08071 pounds, according to Rayleigh. A room 18 by 20 by 10 feet contains 3,600 cubic feet. The air in it, therefore, weighs 290.556 pounds. In liquid or solid form this air could be removed from the room with difficulty by a strong man.

On this view, it appears that we have been passing our lives on the bottom of a deep ocean of comparatively heavy fluid, and that only recently have we learned how to utilize the dynamic reaction of this fluid to construct machines for transportation freely in three dimensions in the interior of this ocean. Who among us is wise enough to foretell what these machines may yet accomplish?



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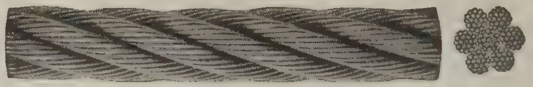

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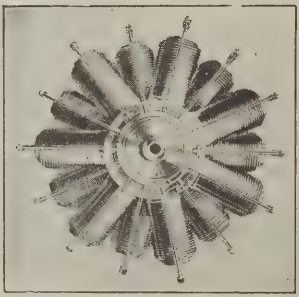

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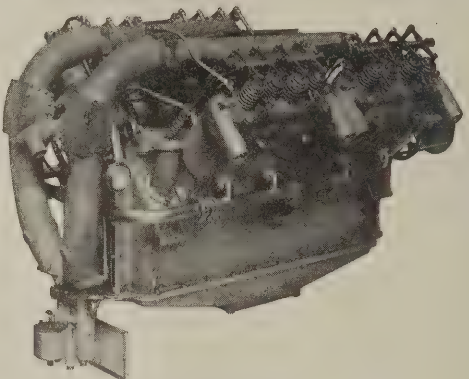

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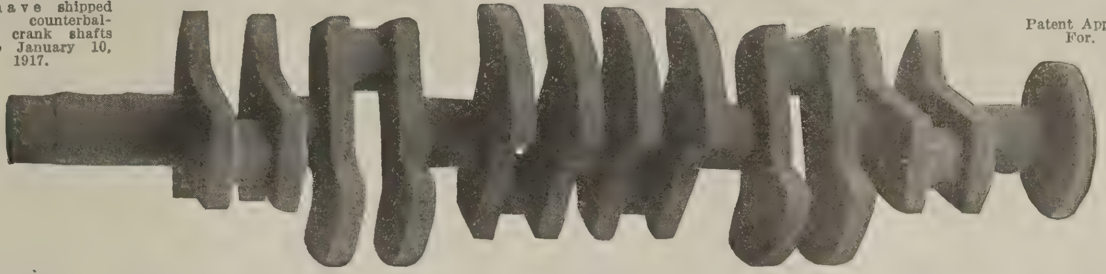

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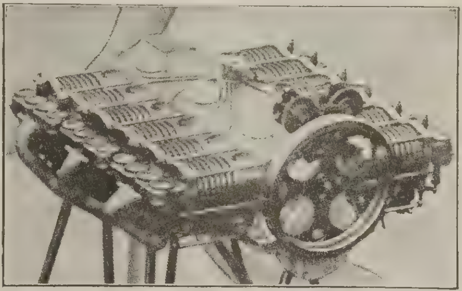

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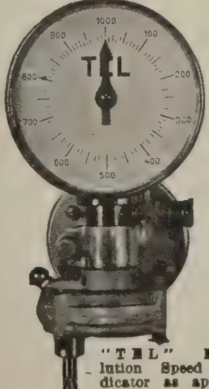

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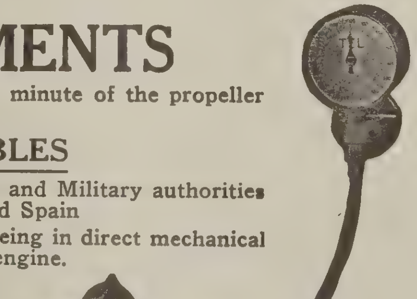

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AERIAL AGE WEEKLY

Vol. 4, No. 20 JANUARY 29, 1917 10 CENTS A COPY

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JAN 1917

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By Sir George Greenhill

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AERIAL AGE
WEEKLY

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Contributing Technical Editors

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VOL. IV NEW YORK, JANUARY 29, 1917 No. 20

$100,000 ASKED TO ESTABLISH MUCH NEEDED AEROLOGICAL STATIONS

THE sum of $100,000 has been asked to establish the much needed aerological stations. In this branch we are about ten years behind, that is, we have not as much equipment as Germany and France had ten years ago. It is, therefore, to be hoped that Congress will allow this appropriation.

Herewith is the copy of the letter from the Secretary of the Treasury, transmitting the communication from the chairman Executive Committee of the National Advisory Committee for aeronautics, submitting an estimate of appropriation for the establishment and maintenance of special aerological stations.

Treasury Department,
Office of the Secretary,
Washington, January 10, 1917.

The Speaker of the House of Representatives.

Sir:

I have the honor to transmit herewith, for the consideration of Congress, copy of a communication from the chairman executive committee of the National Advisory Committee for Aeronautics, of the 9th instant, submitting an estimate of appropriation in the sum of $100,000 for the establishment and maintenance of special aerological stations, as follows:

Aerological stations: The sum of $100,000 is herely appropriated, out of any money in the Treasury not otherwise appropriated, to be expended by the Weather Bureau under the direction of the Secretary of Agriculture for the establishment and maintenance of not less than five special aerological stations to work in co-operation with other branches of the Government in the observation, measurement and investigation of atmospheric phenomena in the aid of aviation, including salaries, travel and all other necessary expenses in the city of Washington and elsewhere.

Respectfully,
W. G. McADOO, *Secretary.*

Hon. Charles D. Walcott,
Chairman Executive Committee,
National Advisory Committee for Aeronautics,
Washington, D. C.

Dear Sir:

Your letter of November 25, 1916 requesting that the Department of Agriculture submit a plan for certain aerological work in aid of aviation, has received careful consideration, and a proposal to inaugurate work of this character is discussed and submitted as follows:

The organic act transferring the work of the Weather Bureau to the Department of Agriculture provides, among other duties, that the Chief of the Weather Bureau, under the direction of the Secretary of Agriculture, shall have charge of the forecasting of the weather, the issue of storm warnings, the display of weather and flood signals for the benefit of agriculture, commerce and navigation. When this law was enacted, in 1891, the art of aviation on the part of man had not been attained; nevertheless, it seems highly appropriate that the means and agencies of the Weather Bureau should be employed, when possible, to investigate the meteorological and atmospheric questions connected with the navigation of the air, and to extend every possible aid in order to facilitate aviation and eliminate preventable accidents and risks. Moreover, such work seems to be fully authorized by existing laws.

The plan which seems best suited to inaugurate and conduct this work is concluded to be to establish several special aerological stations of the Weather Bureau, to be located at aeronautical training or naval base stations now maintained or hereafter to be established by the military and other branches of the Government for the training of aviators and the development of air craft.

The work at these stations would be conducted by special meteorologists operating in close co-operation with those engaged in the actual operations of flying and would consist of detailed observations and measurements of the currents and structure of the air from the surface up to 15,000 or 20,000 feet, and how these phenomena depend on surface weather conditions, how these currents, etc., are influenced by distinctive topographic and surface conditions both of land and water character.

The study of extensive data collected by these means will permit of the formulation of general laws of the relation between surface and free-air conditions and the preparation of standardized free-air maps of typical conditions; also the publication of descriptive texts of the fundamental atmospheric phenomena as affecting aviation. The foregoing is intended to outline briefly the work which can be carried on most effectively and economically only at such representative experimental and training stations of the Army, Navy and other branches of the Government as may engage in aviation and offer the best conditions.

The ways and means of quickly inaugurating this work have been carefully considered, and the best plan seems to be by means of an emergency appropriation to be expended under the direction of the Secretary of Agriculture. Since the initiation of the work is so germane to the functions of the National Advisory Committee for Aeronautics, it would seem proper for it to propose the necessary legislation. The following language thereof is suggested:

The sum of $100,000 is hereby appropriated, to be expended by the Weather Bureau under the direction of the Secretary of Agriculture, for the establishment and maintenance of not less than five special aerological stations to work in co-operation with other branches of the Government in the observation, measurement and investigation of atmospheric phenomena in the aid of aviation, including salaries, travel and all other necessary expenses in the city of Washington and elsewhere.

In conclusion, I will say that I shall be glad to aid further in every way practicable in behalf of this work.

Very respectfully,
D. F. HOUSTON, *Secretary.*

TWENTY RESERVE AERO SQUADRONS TO BE ORGANIZED IN CANADA

TWENTY reserve aero squadrons of the Royal Flying Corps are to be organized in Canada in the near future according to information received by the Aero Club of America from the Aero Club of Canada, of which Colonel W. Hamilton Merritt is President.

The announcement that these squadrons are to be organized was made to the Aero Club of Canada by the Chairman of the Imperial Munitions Board and the aviation training schools which will be established in Canada to train the aviators will be under the control and direction of the Imperial Army authorities, while the Munitions Board will have charge of having constructed the 360 training aeroplanes required. Some of the reports received state that the British Government would decide to spend $80,000,000 in developing aeronautics in Canada, thereby creating sources of supply of aeroplanes and aviators there.

Canada has already supplied close to 500 aviators to England since the beginning of the war. As in the case of the United States, the number of men who are anxious to join the Air Service is large. The waiting list now numbers thousands, and the training will begin on a large scale early in the spring. Candidates for the air service must be from 19 to 25 years of age.

The Aero Club of Canada at Toronto will assist in securing and training the aviators.

According to reliable reports from England, the British Government has spent $250,000,000 for the air service in the past twelve months, in building up the Royal Flying Corps and the Royal Naval Air Service. There are about 12,000 aviators in the two services, one-third of whom are daily in service, the others resting, delivering aeroplanes to the fronts, or under training. A high British authority in an address delivered recently in England intimated that the plans of the British Government are to put 20,000 aeroplanes in service, and whereas there must always be two aeroplanes in reserve for every aeroplane in service, that would mean securing about 60,000 aeroplanes.

Mr. Henry Woodhouse, a member of the Board of Governors of the Aero Club of America, stated that:

"The employment of aeroplanes in the present war is now general. Aeroplanes are used as cavalry, infantry, and artillery, as well as for reconnoitering, bombing, observing artillery fire, photographing the enemy's position, etc."

"There are now aeroplanes of different sizes and most efficient, so that it is possible to employ them for almost any purpose. There are aeroplanes in use which carry 3½ tons of bombs, guns and munitions. Some of these mount three-inch guns, which make them literally flying artillery. These aeroplanes are used to attack trains, ships, and bodies of troops. Operations are being extended more and more, and there is no doubt that the war is to end in the air.

"It was on account of this tremendous expansion of the air service that the British Government recently appointed a secretary of Aeronautics, who is a member of the British Cabinet and formed a large Air Board, which has charge of securing and providing aircraft and the personnel for both the British Army and Navy.

"Other countries are also greatly expanding their air services, and many countries are looking towards the United States to supply the aeroplanes and the motors—principally the latter. They want large, high horsepower motors, and need them in large quantities. Fortunately, American aeroplane motors are now as good as the very best European motors, and there are 17 different types of motors of upwards of 150 H.P. being developed in the United States today.

"Motors of from 200 H.P. up are made by the following firms: 350 H.P., the Dusenberg Motors Company, Roberts Motor Mfg. Co.; 300 H.P., Springfield Motors Company. The Curtiss Aeroplane Company, and the Sterling Engine Company, which is making a motor of 320 H.P.; the Packard Company is making a 250 H.P. aero motor, and the Wisconsin Motor Mfg. Co. a 280 H.P. motor; the General Ordnance Company has just completed a 200 H.P. motor. The Wright-Martin Company is making a 190 H.P. motor. Then, there are the Johnson 180 H.P.; the Oldfield, 150 H.P., the Dayton Aeromotor, 160 H.P.; the Roberts, 165 H.P.; the Van Blerck, 185 H.P.

"A number of these motors are remarkably efficient, and nearly all of the others are good possibilties. The demand for motors of upward of 150 H.P. is such that if all these motors should prove to be efficient, and their makers should have large facilities for manufacturing them, they would all receive orders to keep them busy for two years to come.

"A number of these motors will be shown at the First Pan-American Aeronautic Exposition which is to be held at the Grand Central Palace from February 8th to 15th."

The Pan-American Aeronautic Exposition

AT several important conferences during the past week in Washington and New York City at which were present Howard E. Coffin, chairman of the Industrial Preparedness Committee of the Naval Consulting Board; Alan R. Hawley, president of the Aero Club of America; Henry Woodhouse, Governor of the Aero Club; Army and Navy officers and representatives of the largest aeroplane parts makers and others, the most vital aeronautic problem of the present time was discussed at length. This is the question of standardization and it will be brought to a head with considerable rapidity during the First Pan-American Aeronautics Exposition in Grand Central Palace, New York, February 8 to 15.

The sum and substance of the matter is that while some fifty million dollars' worth of aeronautic apparatus will be built and marketed in this country during the coming season, the industry must undergo considerable remoulding to insure its success and elimination of great economic waste. If this country were to become involved in war, the need of aeroplanes and balloons in great numbers is evident, but under present conditons it would be impossible to supply anything like an adequate number of aircraft on short notice, for the simple reason that the aeroplane makers are absolutely dependent upon the parts and accessory makers and helpless without them. And while parts makers have facilities for large outputs, the present lack of standardization of sizes and materials makes it impossible for even the largest of parts makers to manufacture with the proper degree of efficiency.

Each designer calls for widely divergent specifications and different sets of dies, jigs and tools are required for each job. While this does not sound like a serious obstacle, consider just one case of one company—the largest parts making concern—which has had to fill orders for no less than 2,800 different sizes and specifications of *simple bolts* alone. These were ordered in 60 different lengths, eight diameters, 5 or 6 different thicknesses of heads, etc., and in a half dozen different sorts of metal. Some specifications called for 3½% nickel steel, others chrome nickel, vanadium, high carbon steel, etc. One tenth of this number of varieties would be ample. It would simplify matters wonderfully and insure larger stocks of favored sizes and much quicker deliveries.

The plan adopted to remedy this difficulty, and one which will permit the aeronautic industry to make unhampered strides is to place the matter in the hands of the Society of Automotive Engineers, the body that successfully standardized the automobile industry when it was in chaotic conditon some years back. By officially adopting certain standards for the more commonly used parts, aeroplane makers will conform to these in their specifications and eliminate much lost motion.

Friday, February 9, will be Engineers and Standardizing Day at the Aero Show and all of the prominent engineers interested in the industry will meet upon that occasion to confer on the matter and upon subsequent days will "get right down to brass tacks" in the matter of adopting standards with the S. A. E. Standards Committee. Henry Souther, technical adviser of the Aviation Section, U. S. A. Signal Corps and others will discuss the matter of what aeroplane parts in the Aviation section of the Army can be standardized, illustrating his suggestions with stereopticons, and many other prominent engineers will express their views.

America Prepare

America! Prepare and cry
For strength and haste, our time is brief.
We almost hear the long drawn sigh
Come bursting from our first, great chief;
Who, agonized, has looked upon
The land and people he made one,
All, given up to selfish ends,
Bereft of honor, pride and friends.

And Lincoln too has turned his eyes,
Those deep, sad eyes that looked so far,
In pity that his sacrifice
Should cease to be our guiding star;
In pity that, for ease and pelf,
America has sold herself,
Exchanging glory, pride and power
For the poor profit of the hour.

But, we will pay the awful cost,
Remember that! my Countrymen,
For all the golden chances lost
Will never come to us again.
We had the gift to lift our head,
But found our very soul was dead.
Like undefending sheep we stand,
Inviting butchers to our land.

'Tis not too late to save the day.
"In God we trust" and as we pray
Our spirit rises from the grave
In time America to save,
If we will gird our loins for fight
And come from darkness into light,
And lifting up our banner free,
Shout once again for Liberty.

For "Liberty or death" we fought,
God gave us that for which we sought;
A jewel in the diadem
So bright that it has been to men
An inspiration from on high,
That set a beacon in the sky;
That all the world might look and see
The wondrous boon of "Liberty."

Then wake America! and arm,
Retrieve the past through this alarm;
The rights that have been almost lost
Protect and save at any cost.
We owe this duty to the world
As through its length hot Hell is hurled,
Not for offence on land and sea
But for a great Humanity.

—GEORGE L. UPSHUR.

(The above verses by Mr. George L. Upshur, president of the So-Luminum Mfg. Co., and son of Admiral Upshur, ring forth such true Americanism that we consider it a privilege to present them to our readers.—EDITOR.)

Army Officers Entertained

Major General Leonard F. Wood and the officers, with their families, stationed at Governor's Island, were the guests at The Automobile Club of America last evening, at a dance given in their honor at the Club House by the Automobile Club of America, the Aero Club of America and the Motor Boat Club of America.

The large Assembly Room was specially decorated with flags and bunting, and a feature of the evening was the burning of incense while Oriental dance music was being played. Dancing began at ten o'clock and shortly after midnight the famous Automobile Club supper was served in the Club Grill Room.

About four hundred persons attended the dance, and among the officers from Governor's Island who were present were: Brig. Gen. James N. Allison, Col. L. S. Roudiez, Col. John N. Bellinger, Col. Harry Taylor, Col. O. B. Mitcham, Col. T. Q. Donaldson, Col. John F. Finley, Lt. Col. Frank L. Dodge, Lt. Col. William E. Horton, Major Carl F. Hartman, Maj. J. F. Brady, Maj. A. G. Jenkins, Maj. Halstead Dorey, Maj. G. H. Scott, Maj. F. S. Macy, Maj. J. C. McArthur, Maj. F. H. Lawton, Capt. L. A. Dewey, Capt. H. S. Whipple, Capt. M. S. Keene, Capt. V. La S. Rockwell, Capt. R. M. Parker, Capt. F. J. Miller, Capt. B. Ward, Capt. R. E. M. Goolrick, First Lt. R. A. Osmun, Lt. C. B. Rucker, Lt. C. C. Griffith, Lt. J. D. Wogan, Chaplain Edmund B. Smith.

BOOK NOTICES

The Gasoline Automobile, Its Design and Construction. Volume I—The Gasoline Motor. By P. M. Heldt. Price, $5.00

All students of internal combustion will find a volume which has just been written and published by P. M. Heldt, the technical editor of *Horseless Age,* of interest and value. Mr. Heldt is one of the foremost authorities on the subject, and the work with its profuse diagrams and sketches should find a place in the library of every aeronautical engineer.

The volume is a revised edition of a work that appeared in 1911. On account of the remarkable advances that had been made in the design of automobile engines and in their construction, it was found necessary to practically rewrite the text for this new edition. Of the chapter on engine balance this is particularly true. Not only has this subject greatly increased in importance with the increase in engine speed and appearance of eight and twelve-cylinder motors, but a further study by the author permitted a clearer and more systematic treatment. Of course the underlying principles of both the pleasure car and motor truck engines are the same, but it has been attempted in this volume to go a little further than merely presenting basic principles by giving rules and constants of design wherever possible and to illustrate principles by representative examples.

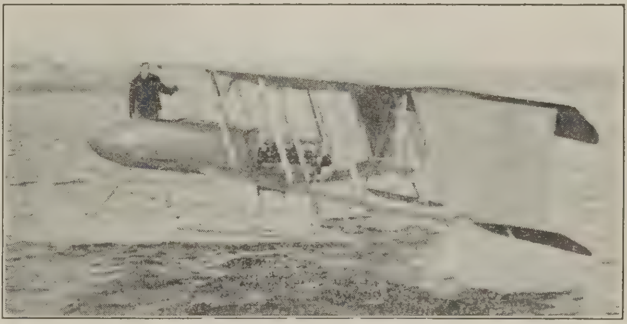
Probably the most important new matter in this fourth edition is that relating to the mechanics of the various types of cams. A chapter on cooling has also been added. In all this edition is considerably larger than the earlier editions, and this, in connection with the heavy expense incident to the extensive revision, made it necessary to slightly increase the price.

Smashes Nose of Aeroplane

Newport News, Jan. 10.—Major Mitchell, U. S. A., member of the government aero board today smashed the nose of an aeroplane at the Atlantic Coast Aeronautical Station while attempting a landing on the testing field. The officer escaped without injury but the machine was badly damaged.

Miss Katherine Stinson, now in Japan with Marquis Okuma and Baron Sakatani.

Burgess-Dunne "Special Reconnaissance" Seaplane



Burgess-Dunne Seaplane.

AMONG the many successful types of aeroplanes developed by the Burgess Company, of Marblehead, Mass., perhaps the most noteworthy is the latest model of the Burgess-Dunne. This is a seaplane built with a fuselage designed so that the operator and passenger may sit side-by-side with the utmost comfort and which does not materially increase the head resistance. It has been designed especially to fill the growing need for a seaplane capable of arising and landing at slow speeds, carrying a large useful load (giving great cruising range) and to respond powerfully to the demands of the pilot.

In general design and construction this machine follows the features as embodied in the more recent types of the inherently stable Burgess-Dunnes which have been in service during the past season with the Naval and Military organizations, Naval Militia and private sportsmen, a description and drawings of which appeared in the August 21st issue of Aerial Age.

General dimensions of the "Special Reconnaissance" seaplane follow:

Span upper and lower planes	46 ft. 6 in.
Chord	6 ft. 9 in.
Gap	6 ft. 6 in.
Length overall	31 ft. 0 in.
Dihederal	0°
Sweep back	30°
Stagger	2 ft. 8 in.
Total	650 sq. ft.
Landing gear	One pontoon
Motor	140 h.p.

This machine, like other Burgess-Dunne machines, is of the pusher type. Ailerons provided on upper and lower planes, of equal area.

The aim of all aeroplane manufacturers and engineers has been to produce a machine which will relieve the pilot of the strain ordinarily experienced in flying. To this end mechanical devices have been developed which will manipulate the controls as is ordinarily done by the pilot. These devices, no doubt, have marked a distinct advance in aeronautics, but it has not added to the improvement of the aeroplane itself. The Burgess Company has realized this aim through the development of the Dunne patents, the Burgess Company having the exclusive license to use this system.

The result is that, not only will a machine of this contsruction excel in performance over any other of equal horsepower, but the operator need only confine his attention to keeping the machine on its course. In other words it is impossible for the Burgess-Dunne to stall, side slip or nose dive. It will absolutely balance itself in flight, and with the motor shut off will assume a perfect gliding angle. At the same time, the operator, if he desires, may manipulate the machine as easily and quickly as any of the standard manually controlled types.

Burgess-Dunne Seaplane "Getting Off" at Marblehead.

SOME PROBLEMS IN AEROPLANE CONSTRUCTION

By Capt. V. E. Clark, Chief Aeronautic Engineer, U. S. Army; Capt. T. F. Dodd, Signal Corps, U. S. Army; and D. E. Strahlmann, Engineer, War Department, Office of the Chief Signal Officer

[*The following paper was prepared by the authors for presentation at the annual meeting of the Society of Automobile Engineers, held on January 11th, in New York, and covers important problems in the construction of aeroplanes for military use in this country. It is reprinted herewith through the courtesy of the S. A. E. Bulletin.—Editor.*]

(*Continued from page* 466)

Gasoline Supply Gage

The development of a gage to indicate the supply of gasoline remaining in the tanks to the pilot, whose seat can be out of view of the tanks, is necessary. Such a gage should be simple and sturdy. The accuracy and reliability with which it registers should not be affected by any change in altitude of the aeroplane. It should not form a possible source of leakage. It should be adapted to both the pressure and suction systems of feed.

Fire Safety-Device

Many casualties have occurred because the aeroplanes have caught fire in the air. While it has been impossible to determine from the wreck just what led to the fire, it is quite probable that many of these accidents were due to back fire into the carbureter that forced burning gasoline out into the surrounding structure, or to a leaking gasoline tank. The development of a device that will render such an accident impossible would save many lives.

In this connection it should always be a rule for aeroplane constructors never to have any electric lead near a gasoline supply or lead.

Altitude Adjustment for Carbureter

The development of a device to regulate automatically the mixture for variations in density of air incident to changes in altitude, would be valuable.

Device for Firing Machine Gun by Engine Shaft

A system by which machine guns would be fired by positive action of one of the engine shafts is necessary on a single tractor screw machine on which it is proposed to fire through the disk of the propeller. The most convenient way would probably be to fire from a camshaft, as it is believed that fire at the rate of 600 per minute is the reasonable limit. The firing pin on the gun should strike the primer at the instant that the rear edge of the blade passes the line of fire of the gun. The propeller should be two-bladed for this work. Such a device should be simple, durable and reliable.

Vibration-Absorbing Material

The development of a material more suitable than ordinary felt for padding the points of support of radiators, and the like, is highly desirable.

Variable Radiators

A more suitable method of permitting the pilot to adjust the amount of cooling done by the radiator in order to compensate for changes in temperature of air, or changes in speed through the air, is necessary. Such arrangement should permit operation by the pilot from his seat during flight, or, better yet, might be automatic; the device being operated as a function of the temperature of the water. It should be durable and should act with reliability.

Variable-Camber Wing

Great speed range is a desirable attribute of an aeroplane, as it permits high speed of travel in the air and yet low speed while landing, which of course makes for safety if the landing place be small or rough. Great improvement in the speed range can be brought about by use of a variable-camber wing surface, that is to say, if the section form of the aerofoil could be changed at will during flight from a shape such as *A* to one similar to *B*, Fig. 3.

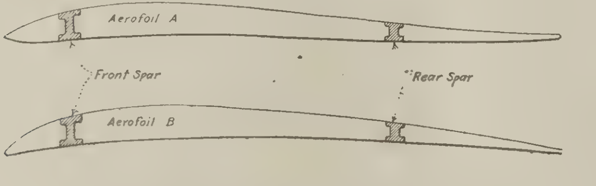


Fig. 3—Variable Forms of Aerofoil Sections

An aerofoil such as shown in *B*, has a high lift-coefficient at large angles of attack (the angle of attack being the angle between the chord tangent to the lower surface and the relative wind). At small angles of attack, where the lift coefficient is low, this shape has a relatively high resistance and will consequently require a great power to drive it through the air at speed high enough for the necessary support.

The reverse is true of such a shape as *A*, which, though the lift coefficient is poor, has an appreciably lower resistance or "drag."

If, then, we could utilize the section *B* for slow speed, as in making landings, and section *A* for high speed, the safe limits of speed between which the aeroplane could fly would be extended. The variable-camber would permit changing the characteristics of the wing to suit conditions.

Performance curves (Figs. 4 and 5) have been worked out for a pursuit machine having a good aerofoil (fixed-camber) in common use today; and a similar series of curves for a machine with an assumed variable-camber wing. It has been assumed that otherwise both aeroplanes are similar. No allowance has been made for the probable increase in weight of the variable-camber machine due to the operating mechanism and structure.

The slow speed of the fixed-cambered wing aeroplane is 61 m.p.h. This will only permit landing the aeroplane on an ideal field by a very skilful pilot.

On the other hand the variable-cambered wing aeroplane can be flown at a slow speed of 56 m.p.h.

The curves show that with the variable camber a higher speed, 127 m.p.h., as against 120 for the fixed camber, can be obtained with the same power. The same speed might be obtained with less power.

If the same high speed were desired the variable-camber wing might have a greater area. It would then have a *slow speed of* 46 *m.p.h.* as against 61 for the fixed camber (allowing for increased weight due to added surface), which would permit its being flown and being landed in an ordinary field, by the ordinarily skilful pilot.

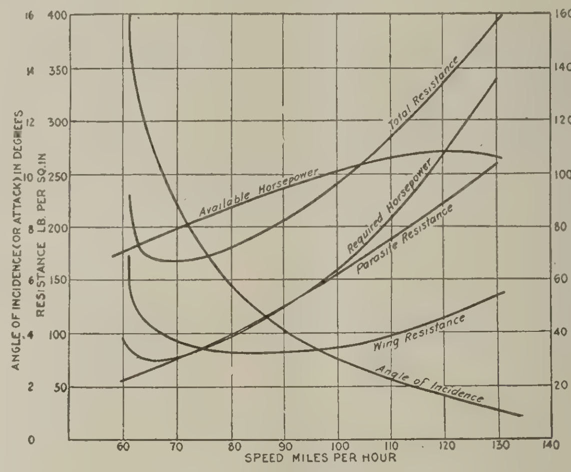


Fig. 4—Performance Curves for Aeroplane with Fixed-Camber Wing

It can, therefore, be seen that the invention of a suitable variable-cambered wing would be a big step in advance.

Appendix

In calculating the values used in plotting the performance curves, Figs. 4 and 5, the weight of machine was assumed as 1150 lbs., and the engine was assumed to develop 140 b.h.p.

The lifting power of a wing is given by $L = K_yAV^2$, where L is the lift, K_y the lift coefficient (which varies for different altitudes of the wing to the relative wind and must be determined by experiment), A is the area of the wings and V the air speed.

Similarly the resistance of a wing is expressed by $D = K_xAV^2$, K_x being a variable coefficient that must be found by experiment.

The speed at which the aeroplane must fly for any assumed angle of attack can be found from the lift formula. The lift in all cases, of course, is assumed to be the weight of the aeroplane.

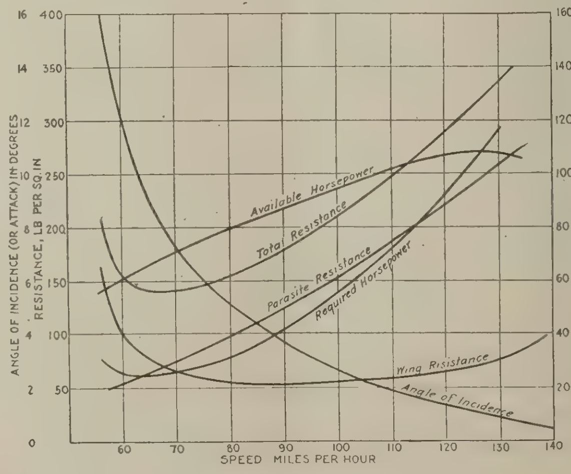


Fig. 5—Performance Curves for Aeroplane with Variable-Camber Wing

The resistance of the wings at these speeds can then be determined and the total resistance found by adding the parasite resistance, that is, the resistance of the body, landing gear, etc.

From the total resistance the horsepower required can be calculated and plotted against speed. The horsepower available is obtained by multiplying the efficiency of the propeller by the brake horsepower delivered by the engine.

The ribs as ordinarily used in the present type of wing construction are as shown in Fig. 6. The weight of such a rib for a small pursuit machine, as assumed in the above calculations would be less than ½ lb. The ribs would be spaced from 12 to 15 in. along the spars. A wing complete with cover, internal bracing, etc., weighs from 0.6 to 0.7 lb. per sq. ft.

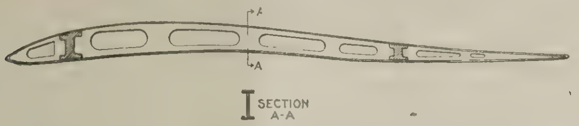


Fig. 6—Rib Used in Present Type of Wing Construction

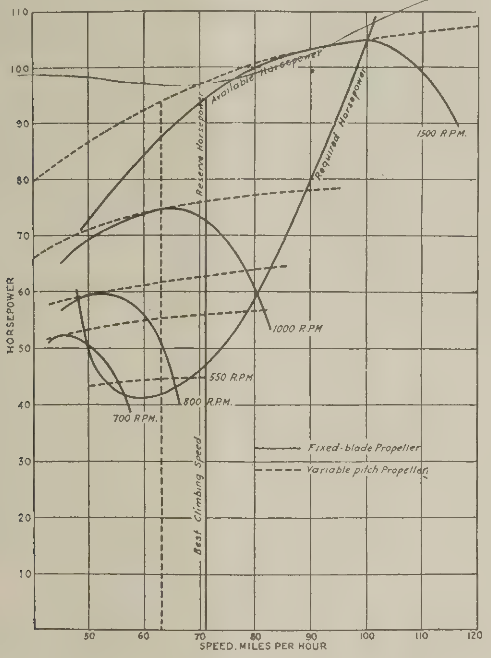


Fig. 7—Performance Curves for Reconnaissance Type of Aeroplane

Propellers with Variable-Pitch Angle

Improved performance of an aeroplane, especially as regards radius of action, can be brought about by means of a propeller whose pitch angle can be varied by the pilot while in flight. The liability of failure, the complexity of the mechanism and the weight added, must be weighed against the gain obtained in the performance.

The gain in efficiency of the variable-pitch propeller over the fixed-blade type is considerable. This increased efficiency makes available more horsepower for climbing, giving faster climbing, and permits throttling down to attain the economical speed, and hence increases the flight radius and the time in the air with a given quantity of fuel.

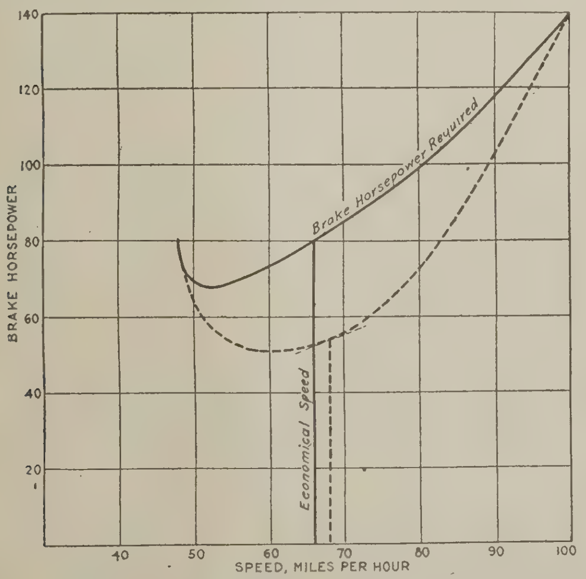


Fig. 8—Showing Economical Speeds of Aeroplanes with Fixed-Blade (Full Lines) and Variable-Blade (Dotted Lines) Propellers

These facts are more clearly brought out by the approximate curves given in Fig. 7, which give the horsepower required, and horsepower available at various speeds for a fast reconnaissance type of aeroplane of refined design. The full lines give the power available for a fixed-blade propeller; the dotted lines for a variable-angle blade. It is assumed that the propeller was designed for maximum efficiency at the high speed of the aeroplane.

The most evident gain made by using the variable pitch as observed from the curves is the increased reserve horsepower available for climbing. This particular assumed aeroplane, with full load, climbs:

With fixed blade: 650 ft. the first minute.

With variable-pitch blade: 715 ft. the first minute.

The increase in the radius of action is very great, the greatest radius of action being obtained when flying at the economical speed of the aeroplane. Figure 8 shows the economical speed in each case.

On one filling of the gasoline tanks the fixed blade would carry the machine about 690 miles in 10½ hours. The variable-pitch blade would carry the same machine a distance of about 1050 miles in 15¼ hours. (Were this machine driven at full power it could go but 600 miles with either propeller.)

These cures, while only approximate, will at least give some indication as to the value of a variable-angle propeller, especially where great distances are to be covered.

The greater efficiency of the variable pitch would be of value in giving increased climbing ability at high altitudes and the possibility of reaching greater heights with a given machine.

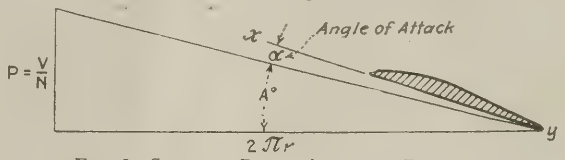


Fig. 9—Showing Pitch Angle of Propeller

Another feature possible, of secondary importance, in a variable-pitch blade is that it can be rotated to give a large negative angle of attack, or possibly reversed, when the aeroplane is on the ground making a landing, thus serving as a brake and cutting down the distance the machine rolls on the ground.

Appendix

The weight of assumed aeroplane fully loaded is 2400 lbs. The brake horsepower of engine is as given in Fig. 11. The fuel capacity is six hours at full power.

If A denotes the angle that the helix line makes with the base line, Fig. 9, V the translational velocity in feet per second and N the propeller speed in revolutions per second, then the distance advanced each revolution, neglecting slip, is $(V \div N)$ ft., which is the effective pitch of the propeller.

Suppose the chord XY of the blade section at any radius V, makes an angle a with the helix line, Fig. 9. Angle a is called the angle of attack of the section. As $(V \div N)$ changes owing to a variation in either V or N, or in both the blade section will have a varying angle of attack, an increase in $(V \div N)$ decreasing the angle of attack and vice versa.

The efficiency of such an element is expressed by

$$c = \frac{\tan A}{\tan (A + G)}$$

where G is the gliding angle, which is a function of the angle of attack and varies with the type of section employed. With the usual section used in propeller design G is a minimum when the angle of attack is about 4 deg. It would therefore be advantageous from the viewpoint of efficiency of the section to keep the angle of attack at 4 deg. throughout the speed of the aeroplane.

This can be accomplished by means of a flexible blade whose pitch angles could be changed a varying amount from the tip of the blade to the root or hub section. Such a blade is out of the question in the light of present day practice. A good approximation to such a blade could be more simply had by rotating the blade about its axis perpendicular to the shaft. With the usual type of section employed the approximation is good as the value of G does not change greatly for a degree or so on either side of the best angle of attack. A mean value for the angle of attack could therefore be found giving practically the same efficiency as though all the sections were at the best angle of attack.

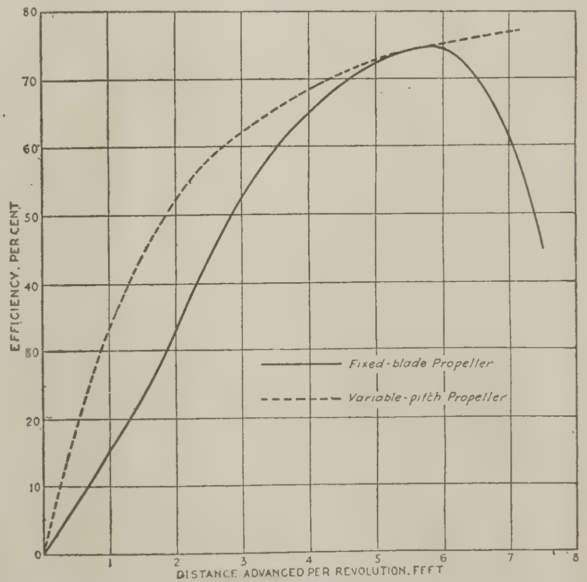


Fig. 10—Relation of Propeller Efficiency and Effective Pitch

Fig. 10 shows curves in which efficiency of a propeller is plotted against $(V \div N)$. The full line gives the efficiency for a fixed blade, the dotted line the efficiency of the same blade were the angle of attack kept at approximately 4 deg. It is assumed that the fixed-blade propeller was designed for a maximum efficiency at a value of $(V \div N)$ of about 6 ft.

(To be continued)

The Pan-American Aeronautic Exposition

The First, Second and Third Floors Are Reserved for Aeroplanes, Motors and Accessories.

The Exposition will comprise the most up-to-date products of the American Aeronautic Industry and includes:

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The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos-Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.

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THE DUESENBURG AERO ENGINE

The Duesenberg aero engine which we describe this week is one of the largest produced in this country. It is the design of F. S. Duesenberg, of racing automobile fame.

The aero engine is of the 60°-V pattern, with 12 cylinders of 4⅞ inch bore and 7 inch stroke. Its full speed is 1,400 revolutions per minute, at which it is expected to develop 300 horsepower. The weight with starter, generator, etc., ready to run is 1,040 pounds. The piston speed is comparatively low, which combined with lightness of reciprocating parts and with the self-balancing properties inherent in "twin-six" construction, will tend to minimize vibration. The propeller is mounted on the crank shaft, thus running at engine speed. To hold the speed down to 1,400 revolutions per minute, the engine will have to swing a very large propeller, which suggests that it is designed for aeroplanes of great size.

Pistons and connecting rods of this engine are made as light as possible consistent with strength and wearing quality. The pistons are of Magnalite, an alloy of aluminum, well ribbed to support the bosses and the piston crown and to aid in conducting away the heat. The rings are of special, three-piece type, with wide surfaces where they bear against the groove, to prevent rapid wear of the alloy. Wrist pins turn in the pistons, without bushings.

The connecting-rods are forgings of chrome-nickel steel, first roughed out, then annealed and machined all over to within 1/32 inch of final dimensions. They are then heat-treated, machined and ground to size. The finished rods are of hollow section, tapering very slightly, with all corners liberally filleted. The bearings at the crank-pin ends of Non Gran bronze, babbit lined. Four bolts are used at the crankpin end of each rod.

As in all Duesenberg motors, the valves are in the cylinder head with both inlet and exhaust on the same side of the cylinder, and with the valve stems perpendicular to the cylinder axes. This arrangement would bring the valves horizontal except for the cylinders being inclined. It has several advantages and has been well tried out in gasoline engines as well as in heavy-oil engines of the Diesel type. The combustion chamber is favorably shaped for easy entrance and escape of the charge, and makes possible an effective cooling of the valve seats. It also guards against having a valve fall into the cylinder when the stem breaks, as has occurred in engines of the ordinary valve-in-head pattern, where the stems are vertical.

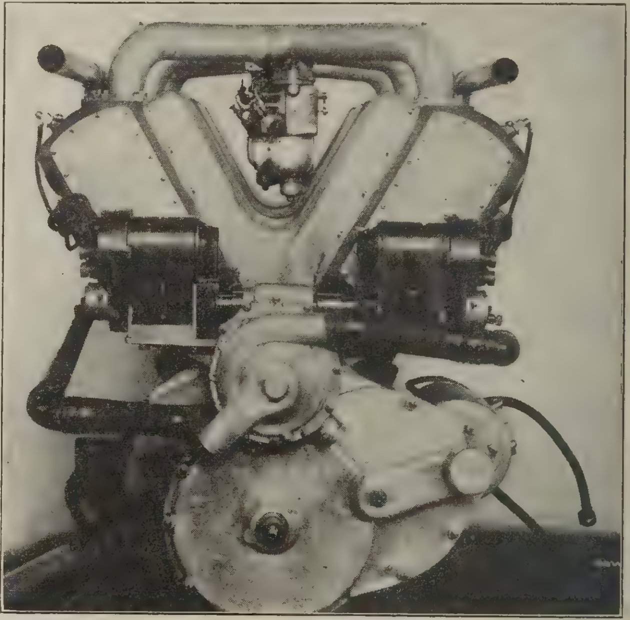
The crank shaft has four main bearings and six cranks, with the two connecting-rods side by side on each crank pin. This latter arrangement used in most engines of the V type, requires that the cylinders be "staggered," and consequently makes the engine a little longer than if the crank pin bearings were made as in the Renault engine, but it allows all the connecting-rods to be made alike and gives each a good bearing, easily lubricated, directly on the crank pin.

The shaft is unusually large and strong. Its diameter at all main bearings and crank pins is 3 inches, or 61.5 per cent. of the cylinder diameter. The pins are 3 by 4½ inches, giving a bearing area of .36 square inch per square inch of piston area for each connecting-rod. Shaft and pins are bored hollow and are fitted with special oil tubes for the forced lubrication system. The finished weight of shaft is 160 pounds.

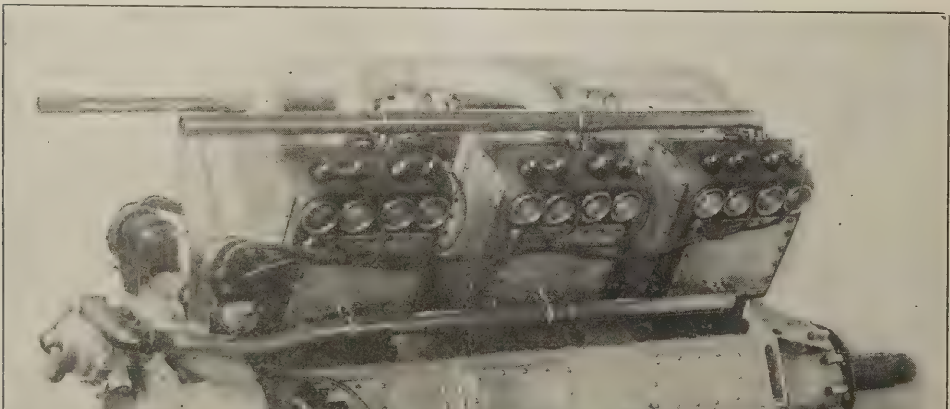
The cylinders are semi-steel castings, weighing 51 pounds to the pair. The brackets supporting the valve-rockers are part of the cylinder castings, so that a pair of cylinders can be removed, with their rockers, without deranging the valve adjustment. An aluminum cover of V-form houses the valve gear of each four cylinders, and helps to stiffen the engine.

The intake manifold is on top of the cylinders, making the carbureter accessible. Either one or two carbureters may be used. Ignition is by two 12-cylinder magnetos, mounted cross-wise at the end of the motor, and driven by a worm-gear from the camshaft. Each cylinder has two spark plugs.

The starter is carried on the timing gear cover, and has a simple device for throwing it in or out. Its gear ratio is 25 to 1. The generator has a Coventry chain driven 1½ to 1, from the crank shaft. All gears, including timer and starter, are made by Harvey process, so that they are strong and durable, although very light. There are two circulating pumps, one for each six cylinders.



End View Duesenberg 12-Cylinder Aero Engine.



Twelve Cylinder Duesenberg Aero Engine—300 H.P. at 1400 R.P.M. and 400 H.P. at 1850 R.P.M.

FOREIGN NEWS

FRANCE

Sub-Lieut. Delorme, killed accidently recently, was looping the loop over Chalons in an aeroplane, in honor of three battalions of his regiment which were returning from the trenches north of Verdun, when a wing broke and he fell. Delorme was the newest aviator mentioned in the communiques for destroying his fifth German aeroplane, and was regarded as having great skill.

The police last week arrested Rene Lamprecht for illegally wearing an aviator's uniform, with the Cross of the Legion of Honor, the Military Medal and the Cross of War with eleven palms, indicating that he had been eleven times mentioned in the order of the day. Only a few Generals, or aviators like Guynemer, Nungesser and Navarre, are entitled to wear eleven palms.

A Paris despatch of January 17th states that the Interparliamentary Group for national action has unanimously adopted a resolution demanding the creation of a permanent inter-ally aeronautic bureau.

After declaring that the efforts expended in technical research and the production of material, as well as the tactical use of this arm, are wholly insufficient, the interparliamentary group declares that "unity of action on a united front under these conditions remains a useless formula."

Answering a demand for volunteers for aviation at Salonica, Paveleka and Haviland, of the American Aviation Corps, have offered their services, and are expected to leave for that front soon.

Edmond Genet, of Ossining, N. Y., formerly of the fourth field service of the American Ambulance Corps, has joined the American squadron.

Georges Bernard, champion middleweight of France, was killed at the Pau aviation field January 20th. Bernard intended to accompany Carpentier to the United States after the war.

After serving in the infantry from the war's beginning until a year ago, Bernard was transferred to the Aviation Corps.

GERMANY

According to the Berlin Lokal Anzeiger, Prince Friedrich Sigismund and Prince Friedrich Karl, sons of Prince Friedrich Leopold of Prussia, have joined the German flying corps. Prince Friedrich Sigismund is twenty-five years old, and his brother two years younger. They are cousins of the Kaiser.

Sixty-six aeroplanes of the Entente Powers were shot down on the various battlefronts in December, according to the German official statement. The losses of the Central allies in the same period were seventeen machines.

The statement reads:

"Our adversaries lost 66 aeroplanes, of which 48 were lost in aerial engagements, 16 by being shot down from the ground and 2 by involuntary landing. Of these machines, 22 are in our possession. Beyond the lines the fall of 44 aeroplanes was observed."

Some of the Recent German Aeroplanes

We are indebted to our contemporary *Flight* for the following facts concerning some recent German machines.

Although up to the present detailed photographs of the latest German aeroplanes now in use on the Western front have not been available for publication, a certain amount of information regarding them is to hand from various sources, which may not, even in the absence of illustrations, be without interest to our readers. The latest *Fokker* biplane is very similar to the fast Fokker monoplane. The upper and lower planes are both of the same span and chord, with slightly raked ends. The wings are perfectly straight, that is to say, there is no dihedral angle and no backward slope. On each side are two pairs of inter-plane struts of round steel tube, streamlined with wood, and the bracing is unusual in that lateral stability is maintained by warping instead of, as is now universal practice, by ailerons, and that therefore there are no incidence wires, while the rear lift and landing wires are at the same time warp wires.

The gap between the planes is very small, so small, in fact, that the top plane almost rests on the upper longerons of the body, to which it is attached by a low cabane. The tail planes are of the usual Fokker type, *i.e.*, the rudder is partly balanced after the fashion of the pre-war Avros, while the elevator is identical in shape with that of the Morane monoplanes. The body is of the modern Morane type, hexagonal in section, and flattening out to a horizontal knife edge at the rear. An Oberursel monosoupape engine is fitted and drives a Garuda propeller. The machine-gun is fired through the propeller field.

The Roland biplane, of which a good deal has been heard lately, is, perhaps, the greatest departure from the beaten track of any modern German aeroplane. It has, according to Mons. Jean Lagorgette in *l'Aerophile,* the peculiarity that its fuselage is as deep as the gap between the main planes, the top one of which is actually attached to the upper longerons and the bottom planes secured to the lower longerons in the usual way. In the modern L. F. G., or Roland, biplane the totally enclosed body, which the Avro firm were the first to introduce, would appear to have been taken into use for military purposes. There can be little doubt that for winter flying this type has many advantages, and it is really surprising that nothing has been done along these lines before, although, perhaps, the reason is to be found in that the view and the range of fire must be thereby restricted. The wings are of short span—some 30 ft.—whilst there is only one strut on each side, which is made up of three-ply wood and has, in addition to its action as a strut, the function usually assigned to the incidence wires. Inside the large body, which is of elliptical section, are the two seats arranged in tandem, the gunner occupying the rear one. In the neighborhood of the occupants' seats are a number of windows in the fuselage through which pilot and observer obtain their view and through which the machine-gun is fired. The engine used is a 160 h.p. Mercedes, and the machine is credited with the following performance: 500 metres in 4 minutes, 1,000 metres in 8 minutes, 1,500 meters in 14 minutes and 2,000 metres in 22 minutes.

The *Halberstadat biplane* has two pairs of struts on each side in spite of its short span, about 28 ft., and is driven by a 120 h.p. Argus motor. The fuselage is of the Albatros type, *i.e.,* built without internal cross-bracing, the necessary rigidity being obtained by covering it with three-ply.

Another machine which is coming into evidence is a small *Albatros* single-seater scout, which has been nicknamed the "German spad." This machine has little resemblance to the standard Albatros biplanes as we know them. The span is only about 27 ft., and there is only one pair of struts on each side. Needless to say, the engine is a large water-cooled stationary motor, but what make is fitted as standard is a little uncertain. Both planes are of nearly the same span, and there is no dihedral angle. The fuselage is of the monocoque type, or, more correctly speaking, it is of rectangular section as regards its main structure, the flat sides and top being streamlined with formers and stringers. The tail plane is rounded as in all the later type Albatros biplanes, and the rudder is slightly ahead of the elevator.

GREAT BRITAIN

At the annual meeting in Edinburgh on December 13th of the Scottish Aeronautical Society a paper on "Weather Observation from an Aeroplane," by Lieutenant C. K. M. Douglas, R. F. C., was read. Having been fortunate enough to be for some months this year almost daily amongst the clouds of Northern France, Lieut. Douglas had studied the formation of both stratus and cumulus clouds at close quarters, and submitted some records of the temperature and other conditions under which they developed. A cumulus cloud, which was the visible evidence of a stream of rising air, might give rise to a thunderstorm. Unless, however, the fall of temperature from the ground upwards was very great thunderstorms would not develop. A knowledge of this temperature gradient was thus very important in the prediction of thundery weather, and Lieut. Douglas put in a plea for the use of the aeroplane in peace time for this purpose, as, in addition, the field of view at a height moderate for an aeroplane was so extensive that distant thunderstorms could easily be observed. He himself had seen clouds 100 miles off from a height of 8,000 ft. The observations made had been quite secondary to observations of a military character, and represented only a very small part of what could be done for meteorology by aeroplane observers.

January 15th, on the Doiran front, a German aeroplane was brought down by British gunners near Neochari, which has been under heavy fire from the land and naval forces of Sarrail.

RUSSIA

Russian aviators on January 16th, dropped bombs on Barjemi and Sudami, on the Danube, in the region of Braila, causing fires on several vessels.

Aeroplane transports on one of the German battle fronts, unloading the wing crates.

MODEL NEWS

Edited by G. A. Cavanagh and Harry Schultz

CLUBS

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29 West 39th Street, New York City

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921 Ravenna Boulevard, Seattle, Wash.

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Oxford, Pa.

Lighter Than Air Models

In view of the attention which has been attracted to the lighter-than-air type of aircraft, not only by Zeppelins, but also other airships of various sizes and types, it may not be out of place to draw attention to the fact that it is quite possible to make satisfactory models of such craft. As there seems to be no doubt that for military purposes there will always be a distinct scope for airship work it may also be that experimenting in such a direction may not be altogether without profit. Apart from the military aspect, there are many who hold to the opinion that when peace does come again, airships of the smaller types will almost, if not entirely, take the place of the spherical balloon. It can be readily seen that a small airship offers considerably more opportunities for sport than the balloon, as it will be possible to make journeys from point to point instead of having to depend upon the fickleness of the wind. It must not be overlooked that among the many things which are being learnt in the war is much that pertains to airships of various sizes, and that knowledge will be to a large extent available for more peaceful use when the war is over.

However that may be, there is plenty of scope for the aeromodellist who, having become tired of playing with "flying sticks" or scale models of full-sized machines, wishes for new fields to conquer. He will find that although it will perhaps not be quite so simple as some of his work in the past, it will be exceedingly interesting, and the overcoming of the various obstacles will but add zest to his labors.

The first thing considered will be the size of the envelope necessary to carry the required motor power, but anyway it will be found inadvisable to experiment with anything less than 12 in. by 2 in., which will give a capacity of 35.63 cubic feet. Using commercial hydrogen, this should give a lift of 34.24 ozs., and Mr. Johnson, Model Editor of *Flight*, calculates that the envelope made of goldbeater's skin would weigh 8.36 ozs., so that the net lift would be 25.88 ozs., a little over a pound and a half.

Another primary consideration will be the shape of the gasbag, and this appears to offer plenty of latitude for experimentalists to employ their ingenuity. The design must be such that the envelope can be driven through the air with the minimum amount of resistance.

The devising of ways and means of getting the most power with the minimum of weight also opens up a wide field, and then there will be the question of how and where to suspend the power plant, together with the propeller or propellers.

As to the material for making the envelope, Mr. Johnson states that for small models, as mentioned above, it is only practicable to use goldbeater's skin, which is very thin and tough. It weighs 0.1 oz. per square foot, but cannot be obtained in larger pieces than about 24 in. by 14 in.

The car of the model dirigible will be very much on the same lines as the *fuselage* of a model aeroplane, and, of course, the propellers will be similar, although larger, and driven by rubber motors. It will be found most advantageous to arrange one propeller, or rather tractor, at the front and one at the rear, and they should be of such a pitch as to turn at about 500 revolutions a minute. The car must be suspended with the guy threads or strings arranged in a triangular system in order that the strain may be properly distributed.

The model is steered in a horizontal direction by means of rudders and it will probably be found most advantageous to arrange one behind the front screw and the other just in front of the rear one. The framework of the rudders may consist of steel wire and the coverings of goldbeater's skin or light proofed silk. Elevators can be fitted, but Mr. Johnson states that for elevation, horizontally revolving propellers are the best. In making rudders and elevators and also the rest of the model it is essential to remember that everything should be made as smooth as possible in order to reduce skin friction to a minimum.

Presuming that it is intended to use hydrogen for inflating the airships, it is not advisable to attempt to make one's own gas. It will be found much better to obtain it compressed in a steel cylinder. One most important point to remember, however, is that hydrogen and air form an explosive mixture, and so extreme care should be taken to see that no naked lights are about when the envelope is being inflated. Coal gas could be used, but its lifting power is only about half that of hydrogen, and it would be necessary to have a force pump to get it into the envelope.

Nebraska Model Aero Club to Hold Contest

Final arrangements for Lincoln's first model aeroplane flying contest at Antelope Park at 2 o'clock Saturday afternoon, January 13, were made at a recent meeting of those interested in the Nebraska Model Aeroplane Club. Twenty-four boys already have purchased machines and expect to enter the race.

The committee will extend an invitation to Governor Morehead, Governor-elect Neville and Mayor Charles Bryan to act as judges. State Engineer George E. Johnson will be asked to serve as range finder, to determine the height to which the machine fly.

Col. John G. Maher will be official timer. Hugh Harlan and Senator Samuelson will be checkers, and A. C. Brightenburg will be official starter.

Boys who have made their models will have them balanced Saturday by the founder of the club, after which they will be lent to stores to use for window displays in advertising the contest.

Among the twenty-four machines expected will be all classes of gliders and of planes whose motive power consists of rubber bands. One exhibition machine will be shown, constructed of aluminum throughout, with a gas engine to furnish the propulsion.

Scoring will be on the following basis, for the self-propelling planes: Workmanship, 20; get away, 10; altitude, 10; duration, 10; direction, 20; distance, 30.

In the glider class the machines will be balanced to loop the loop, and each loop will count the contestant 10 points. In other respects, this is the scoring basis for this, the most elementary of the five classes: Workmanship, 10; direction, 10; duration, 10; distance, 20; altitude, 20.

Machines outside the gliders will be started from the ground. If they do not rise within sixty feet from the starting line, their "pilot" may recover them and start them out of hand, but he will be penalized 15 points on "get away."

Col. John G. Maher, one of those interested in the contest, is enthusiastic about aeroplane flying as a sport for boys. "It develops the mechanical ingenuity to the highest degree and is a clean and invigorating sport, which ought to be encouraged."

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

SOME LUCK

"Smith is a lucky guy, isn't he?" remarked Brown.

"He sure is," agreed Jones. "Why, if he tumbled out of an aeroplane he would fall right through a hospital skylight and on to an operating table."—*Chicago Examiner.*

Last year in London 867 persons were killed by traffic accidents. The increase over 1914 caused by darkening lights for Zeppelins was 281, more than the Zeppelins slew themselves. New York doesn't need air raids to kill 100 more than the London peace-time quota.—*New York World.*

A SPELLING LESSON

Plenty of—
Planes,
Equestrians,
Armor,
Cannon,
Enlistments
spell peace.

Subway ventilation is simpler in Paris. A Zeppelin bomb blew a hole through into the Metropolitan Underground. The engineers looked at it; the place was convenient; "Why not leave it so?" they asked. So ordered.—*New York Herald.*

ANSWERS TO CORRESPONDENTS

F. E. (Boston):
No, a hog's hair brush would not do for doping the engine.

S. O. S. (Brooklyn):
No, it is not true that Blimps lay eggs.

When is an aeroplane over-stable?
When it's a loft.

Why are banana skins like pupils?
They both mean slip up, backwards.

B. O. O. B. (Phila):
No, it does not matter having the c. g. in the gasoline tank, so long as a reliable filter is used.

Non-Stop (Springfield):
Yes, the war is still going on, and you are the 9849th correspondent who has solved the problem of perpetual motion.

Ripe (Flatbush):
To convert monoplane figures to biplane figures, use the following formula: $C_2H_5OH + H_2O$.
If the stagger is too pronounced, try more water with it.

Pup:
All pupils are called "pups." We see nothing degrading in it. Don't worry, you'll grow up some day.

The Zepp Bogey.—Mother (*seizing recalcitrant son by the nether garment*): "Now then, young Albert, you come indoors."

Hero: "No-o! Wants to see Zeppelins."

Mother: "'Ere if you aint a good boy I'll tell the Zeppelins not to come any more."—*Punch.*

LIMERICKS

Cuthbert, on his Multiplane,
Side-slipped from this world of pain.
His instructor said quite sadly,
"Engine's done-in rather badly."

! ! !

When starting up her "Baby tractor,"
Mary slipped and badly cracked her
Head and prop. (make, Chauvière).
The latter's not beyond repair.

! ! !

On his home-made parachute,
Algy tried an idea cute.
As the 'chute remained shut up,
Algernon was sold a pup.

! ! !

Banking on a speedy scout
Percy sneezed and then fell out.
Percy's gone. But being stable,
To safely land, the 'bus was able.

! ! !

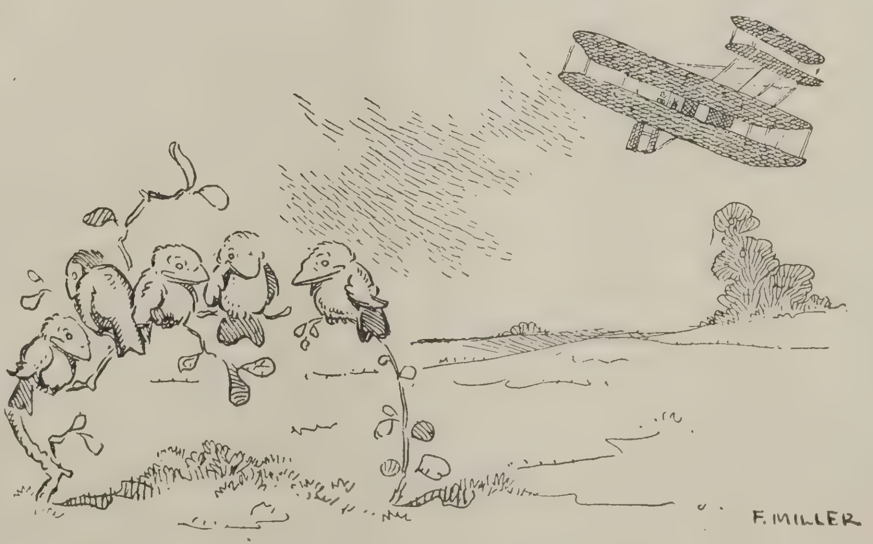
He walked with a stick and a limp.
On his head was a very fine "pimp."
When they asked "At the Front?"
He replied with a grunt—
"No. Looping the loop on a Blimp."

! ! !

It's a wonderful 'bus, the Sikorski,
Of humans it takes up a scoreski.
There is much motorvitch,
The mechanics for which
Sleep in bungalows built on the floorski.

! ! !

There was a young man of Pitlochry
Who landed his "plane" in a rock'ry.
When he came to, he said,
As he stood on his head,
"I'm a fern growing out of the crock'ry."



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"Sure! Just learning to use its wings."

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HIGH ANGLE FIRE AT AIRCRAFT

By SIR GEORGE GREENHILL

THIS war is full of surprises to our old-fashioned professional soldier. Two years ago he would have denied the practical utility of calculations of long range artillery fire, up into the air at an enemy airship overhead.

In these calculations the work is complicated by reason of the varying tenuity of the air as the shell rises, and the major part of the range where the shell is flying almost horizontally is made in air which may be half the density or so of that at the ground.

Even in ordinary direct fire close over the ground the variation of tenuity with barometer and thermometer has been found to require careful attention, especially where an advance is made under the cover of the friendly artillery firing overhead from the rear. Here a slight variation in air density is enough to make the advance unsafe, unless the tenuity factor, τ, has been carefully estimated. A nomographic chart has been devised by Major Hezlet, on which τ can be read off for given barometer and thermometer, and then translated into the appropriate percentage change of elevation of the gun.

As a preliminary calculation an estimate must be made of the average height reached, and of the mean tenuity of the air, to be taken as uniform over the whole range. These tentative results are useful as a stepping stone, and in checking the more careful calculation, where it is usual to divide the air up into strata of uniform density, say 1,000 ft. thick, corresponding to a fall of about 1 in. in the barometer.

The work of making ballistic calculations for long range high angle fire is always tedious and heavy even for the skilled computer, assisted by a scheme of computative details, where the numbers can be filled in. Mathematical interest is absent except in an attempt to justify the daring approximations employed; and the absence of rigor in the method would disgust the modern school of analysis.

The extra complications can then be imagined where the target is not a town stationary at sea level, but an airship in swift movement 10,000 ft. or 15,000 ft. up in the air, seen on a line of sight pointing up at any angle up to 45 deg. and more.

The shell need not be heavy for the destruction of an airship, so that 2 in. or 3 in. caliber will be large enough for the gun. But the velocity must be high to shoot straight with long range and accuracy. The small light shell feels the resistance of the air more than the heavy shell, and the trajectory sooner becomes too curved for accurate shooting to be made; and at this point a limit to the range of practical utility is reached beyond which a shot should not be taken at the airship. A coin held out at arm's length to cover an airship of known length provides the casual observer with a simple range finder. Taking the arm's length as 2 ft., and ten pennies to the foot, a penny subtends an angle of one in twenty, and will cover an airship broadside on at two miles, taking the length of the body as 160 m., or ten lengths to the mile. And so on for the other coins, as shown in a useful little table, the "Coin of the Realm Zeppelin Range Finder," drawn up by Mr. J. W. Hicks, of Woolwich.

The sun's diameter is half a degree, and the sun advances through the stars twice his diameter in a day. The moon's diameter is also about half a degree, and would go six times across the penny held out at arm's length, and three times into a threepenny bit. But the gunner should be provided with an official range finder, such as a Barr and Stroud, and reckoning the target within reach of his gun he must trust to his range table for the tangent elevation appropriate for the range. This range table will have been worked out previously by a staff of skilled computors, but in anti-aircraft fire the complication comes in of the extra variable of the angle of sight up at the target in the air, as well as of the range, in correcting the tangent elevation to be given, for the same range on the level, with the angle of sight zero.

Tangent elevation is the name given to the angle between the line of sight and the axis of the piece; it gets its name because the tangent of this angle is proportional to the elevation given on the back sight; this elevation divided by the distance between the sights, front and rear, being the tangent of the angle.

Quadrant elevation is distinguished as the angle made with the horizontal by the axis of the piece, and when firing up in the air the elevation of the line of sight must be added to the tangent elevation to obtain the quadrant elevation. It derives its name from the old gunner's quadrant, in which the vertical was given by a plumb line, now replaced by the spirit level in modern use.

Firing with a line of sight pointing downward, as from a battery on a cliff at a ship out at sea, the angle of sight must be deducted from the tangent elevation to give the quadrant elevation, so that it is possible for a quadrant depression to be required, where the angle of sight exceeds the tangent elevation. An automatic sight can be made which converts quadrant depression into tangent elevation mechanically by a cam. Here the height above sea-level is fixed except for the slight rise and fall of the tide, and this is allowed for by a fine adjustment. But this fine adjustment would change into an important part of the mechanism if the automatic sight was required for an anti-aircraft gun for firing at a target overhead at a height varying between large limits.

In old times before these large angles of sight were contemplated, a favorite subject of scientific discussion in the sergeant's mess was the amount of alteration required for firing up or down hill. But bets had generally to be declared off, as the field artillery gunner was talking in tangent elevation, while quadrant elevation was in the mind of the garrison gunner. On such a moderate slope as would occur in practical warfare the alteration in tangent elevation is so small as to escape notice, and so the field gunner backed the opinion of no alteration of elevation, meaning tangent. But quadrant elevation of the garrison gunner requires the addition or subtraction of the angle of sight, an appreciable alteration. So no conclusion could be arrived at, because the two schools were using the same name to denote different things.

The alteration of tangent elevation begins to be appreciable with the high angle of sight required against aircraft. A convenient formula as a good first approximation is called the *Cosine Law.* On this law the tangent elevation for the level is reduced by a factor, the cosine of the angle of sight, to obtain the elevation, firing at the same range, right up the line of sight to the airship.

The rule or law can be justified by supposing the trajectory sight straight and flat enough for the component of air resistance across the line of sight to be neglected; so that the shell is actuated by two component forces, one of gravity vertically downward and the other air resistance acting down the line of sight. In an analytical geometrical discussion the motion is referred to these two oblique co-ordinates, the vertical and the line of sight.

Having calculated a trajectory of the ordinary range table for the given range along the line of sight horizontal, the ordinates may then be supposed to turn about their feet on the inclined line of sight so as to remain vertical, like men marching up a hill. The trajectory is then fore-shortened by the cosine of the angle of sight, and so is the elevation on the back sight to correspond, the tangent leaf remaining perpendicular to the axis of the gun. In some mountain artillery required to move on rough ground and steep slopes, the tangent leaf was suspended by a pivot so as to hang vertical and so give the correction automatically of the Cosine Law.

The Cosine Law will serve, however, for general explanation and practical use at a reasonable moderate range, especially as the correction for speed of target is of much greater importance than any second order correction of elevation.

Aircraft guns should always be mounted in a brace alongside, like pistols, to check each other and serve for continuous ranging. Too much time is lost if the guns are not close together, for it is difficult to keep the gunners in direct verbal communication, and the attack may be directed on different targets.

Questions pour in on this problem of fire at aircraft, always with insufficient data and obscurely expressed. A complete answer to one of these questions might involve a fortnight's work of a skilled computer, in addition to writing out a complete treatise, only to be told at the end—That is not the question.

But assume a simple normal case of a range of 2,000 yards at a height of 3,000 ft., an angle of sight of 30 deg. The angle of ordinary elevation in the range table for 2,000 yards is, say, 2 deg.; reduce this by the factor cos. 30 deg. to 1.7 deg., and with this elevation a good trial shot will be made, near enough for correcting the next shot of the gun alongside, provided the target will oblige by remaining stationary.

The question arises of the influence of tenuity on the rate of burning of a fuse, as affecting the setting of a time fuse, as also the alteration of the time of flight. Experience seems to show that the effect is not noticeable, the influences at work acting to cancel each other.

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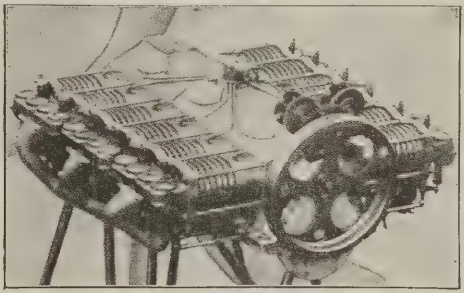

¾ top view of ASHMUSEN 12-Cylinder 105 H.P. Self Cooled Aeronautic Motor

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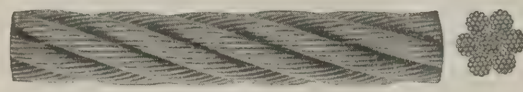

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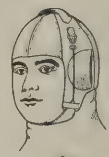

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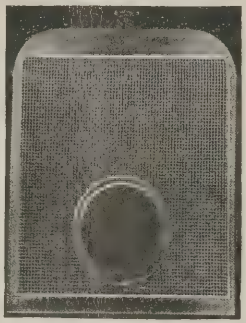

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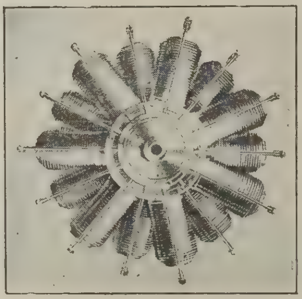

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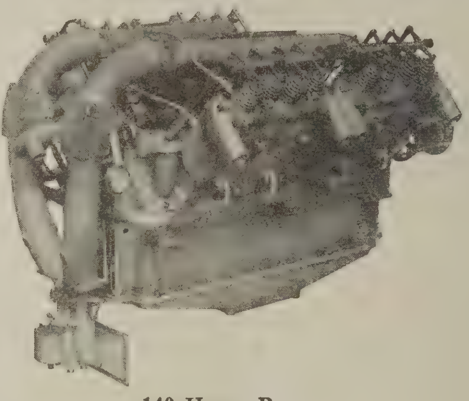

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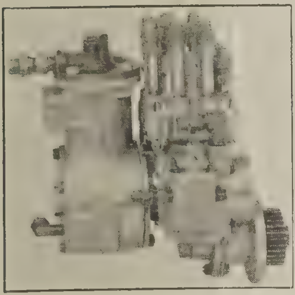

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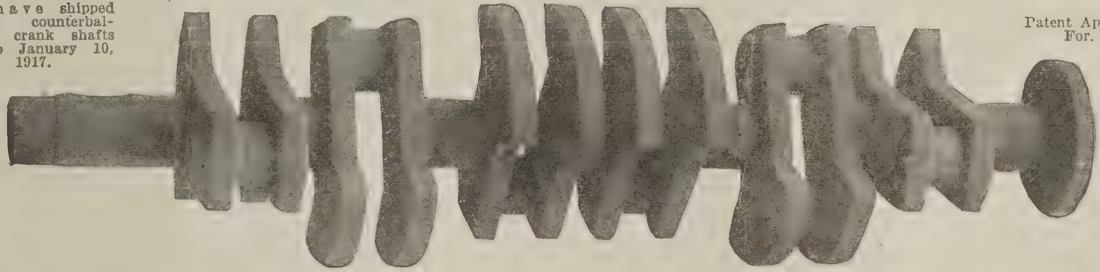

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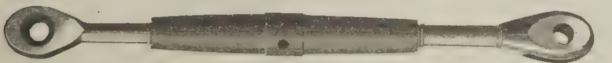

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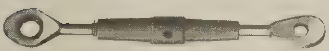

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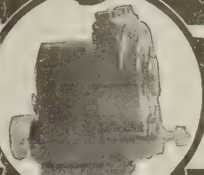

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WEEKLY

Vol. 4, No. 21 FEBRUARY 5, 1917 10 CENTS A COPY

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Military Aviation
A Study Prepared in the War College

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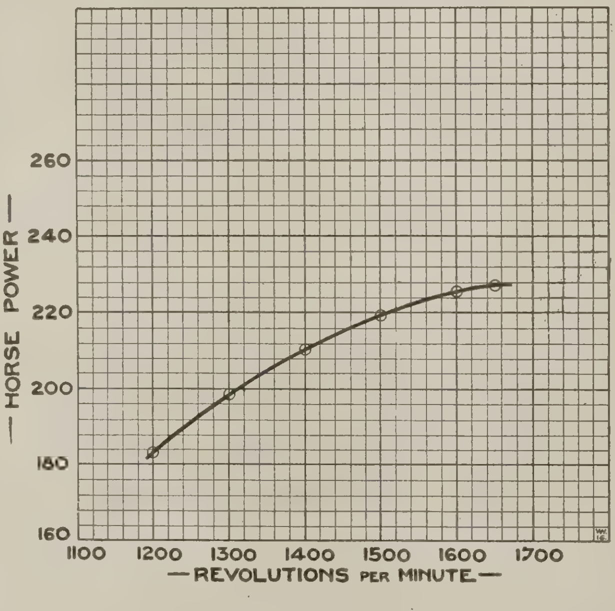

Duration of Test	1 hr.
Average R. P. M	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
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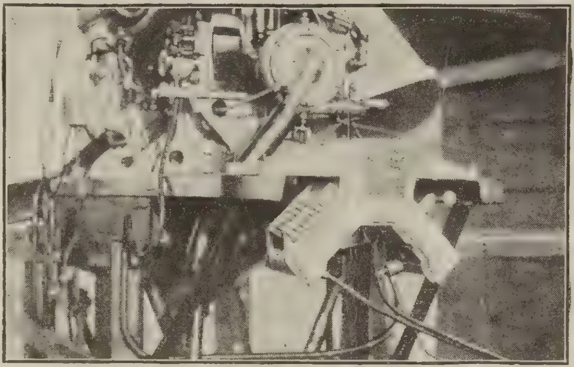
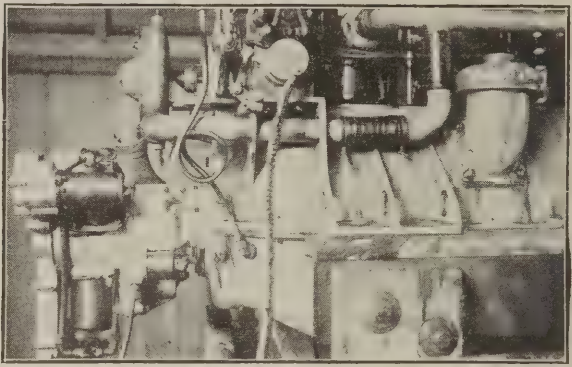


Model C starter mounted on engine



Model D starter mounted on engine

It is an air motor for starting, and a compressor to store air for its own energy in starting.

It replenishes its energy for starting in less time than any other starting system in existence.

It is entirely self-contained.

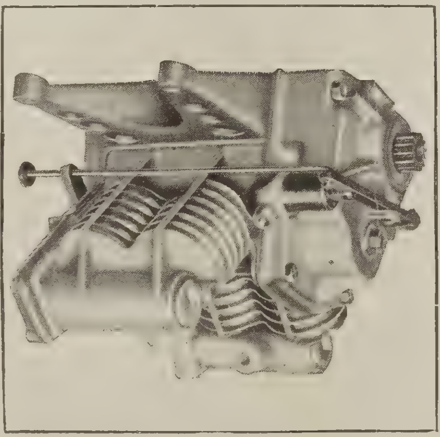
It couples direct to the end of crankshaft of motor.

It needs no alteration in motor or other gear reduction for attachment.

It has ample power and speed for magneto starting.

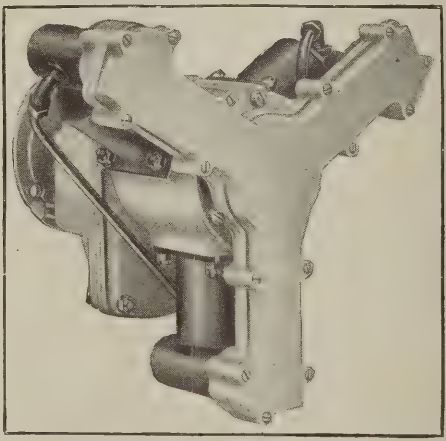
Model C—For starting engines up to 250 H.P. The device weighs 39 pounds, and complete with every fitting for single engine installation 70 pounds; for twin engines 110 pounds.

Model D—For starting engines up to 150 H.P. The device weighs 34 pounds, and complete with every fitting for single engine installation 58 pounds; for twin engines 96 pounds.



Model C

The Perfect Starter is of the compressed air type, convertible to either an air motor for starting, or an air compressor for storing air into a specially constructed tank. A transmission is combined in the construction of the device taking care of all changes of operation. It is entirely idle except when in action as a starter or a pump, and when pumping releases automatically at maximum pressure. It will average 15 separate starts on a volume of air which is pumped back in less than 30 seconds.



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WEEKLY

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VOL. IV NEW YORK, FEBRUARY 5, 1917 No. 21

$4,800,000 APPROPRIATED FOR AERO COAST DEFENSE

Representative Swager Sherley, of the fifth Kentucky district, has just secured an appropriation from the House of Representatives of $4,800,000 for dirigibles, kite balloons, aeroplanes, and aero equipment of all army fortifications. The sum of $3,600,000 is for aeronautics in connection with fortifications in the United States proper, and $600,000 for the Hawaiian Islands and $600,000 for the Philippines. This is the first time that such an appropriation has been made in the United States, and it is expected that the Senate will accept the allotment, which is part of the $60,000,000 fortification bill passed by the House January 30. It came in less than two months of the statements issued by the Aero Club of America in regard to the aerial weakness of the 75 forts, which have not, as yet, any aerial eyes.

Mr. Sherley is 45 years old and has been a member of Congress since his 31st year. He is a graduate of the University of Virginia. He is a member of some of the most important committees in the House.

THE PAN-AMERICAN AERONAUTIC EXPOSITION

According to advices from Howard E. Coffin, who is chairman of the First Pan-American Aeronautic Exposition in Grand Central Palace, Feb. 8-15, there is considerable interest being taken at the Capitol in the exposition. There will be a large delegation of senators, congressmen, army and navy officers, as well as foreign ambassadors and military and naval attaches who will make the trip from Washington to visit the opening.

The exposition promises a greater attendance than any other industrial show ever held in New York, with possibly the exception of the long established automobile shows. At this early date the advance sale of tickets, already amounts to more than 25,000—a surprising record and one without precedent. Of this number none have been sold singly, all having been disposed of by mail or from the office of the Aero Club in books of 25 tickets at $10 per book. The interest being taken, as evidenced by the advance sale, is even beyond the expectations of the promoting organizations, which are the Aero Club of America, the Pan-American Aeronautic Federation, the American Society of Aeronautic Engineers, and others. However, this is to be considerably more than a mere "show;" it is the establishment of a permanent institution and annual clearing house to develop and exchange ideas that will promote the aeronautic industry.

On the other end of the work, so rapidly has exhibition space sold, that there is now very little left on the two large floors and exhibitors are "renting the air, with anchorage in the ceiling," for dirigibles and balloons will be suspended from the ceiling, as will also several of the aeroplanes where application for sufficient floor space was made too late.

The exposition will be intensely interesting to all classes of people. Owing to the great number of prominent men who have taken up aviation in the past year or two, there is a popular interest which will more than equal that taken in the international meets of former years, and the same social aspect will be upheld. The widespread use of air machines in warfare has accelerated this interest. While Europe has had her hands full turning out air craft fast enough to supply the demands of war, America has had time to study and improve her aeronautics. Many new designs and new devices will be on exhibition to interest the layman, the Army and the Navy men, the manufacturer, and even the children.

Naturally the United States Army and Navy exhibit will be among the most interesting. One of the things which will build for the national importance and permanence of the exposition will be our Government's part. Practical displays and demonstrations will be made by the War Department, the Army, the Navy, the Signal Corps, the Aviation Corps, the Bureau of Standards, the Weather Bureau, the Geodetic Survey, etc., thus giving the general public a chance to see its own government in preparedness operation at close range.

There are already more than 100 exhibitors entered, and the exposition will embrace everything aeronautical, all set in a most artistic staging, suggestive of flight. Every day is to have special features.

TEMPORARY ORGANIZATION OF AERONAUTICAL MANUFACTURERS EFFECTED

To secure closer cooperation between the Government, individual aeroplane manufacturers and the Aero Club of America, a meeting of aeronautical manufacturers was called by Mr. Harry Bowers Mingle, president of the Standard Aero Corporation of New York, on January 24, 1917. At this meeting, held in the Woolworth Building, the following concerns were represented:

Aeromarine Plane & Motor Company, Inglis M. Uppercu; Wright-Martin Aircraft Company, Edward M. Hagar; Standard Aero Corporation of New York, Harry Bowers Mingle; John D. Cooper Aeroplane Company, John D. Cooper; Samuel S. Pierce Aeroplane Company, S. S. Breeze, and Witteman-Lewis Company, C. R. Witteman and S. C. Lewis.

At the meeting were also Messrs. L. D. Waldon and Howard E. Coffin, the latter chairman of the Pan-American Aeronautical Exposition, to be held at Grand Central Palace, February, 8—15. Mr. Coffin is also a member of the Advisory Commission to the Council of National Defense.

After an informal discussion, at which the purpose for calling the meeting was stated by Mr. Mingle and Mr. Coffin, it was unanimously

> Resolved, that a temporary organization of manufacturers be immediately formed, Mr. H. B. Mingle to be appointed as Chairman and Mr. Inglis M. Uppercu as Secretary.
>
> Further Resolved, that the Chairman appoint a Committee of Five, of which he should be a member, to act in show matters and to arrange for an early meeting of the Board of Governors of the Aero Club, relative to the handling of this and future shows; and, to report later to a meeting to which all the manufacturers of aeroplanes will be invited on the matter of the formation of a permanent organization.

The Committee on Organization issued invitations to all of the aeronautical manufacturers for a meeting to be held on Wednesday, the 31st inst., in order that a permanent Organization of Aeronautical manufacturers be completed for the Pan-American Aeronautical Exposition.

$5,200,000 Asked for Aerial Coast Defense of Philippines and Hawaiian Islands

CONGRESSMAN SHERLEY, January 19, introduced the following bill, which was referred to the Committee on Appropriations and ordered to be printed.

Making appropriations for airships and other aerial machines and accessories for use in connection with the seacoast defenses of the United States and the Philippine and Hawaiian Islands.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to be immediately available and to continue available until expended, namely:

For the purchase, manufacture, maintenance, operation, and repair of airships and other aerial machines, buildings for equipment, and other accessories necessary in the aviation section for use in connection with the seacoast defenses of the United States, $5,200,000.

For the purchase, manufacture, maintenance, operation, and repair of airships and other aerial machines, buildings, for equipment, and other accessories necessary in the aviation section for use in connection with the seacoast defenses in the following localities:

Philippine Islands, $600,000.
Hawaiian Island, $600,000.

Great Appreciation for Need of Aerial Defense at Congress of Constructive Patriotism

REAR-ADMIRAL ROBERT E. PEARY, in an address at the banquet which terminated the Congress on Constructive Patriotism of the National League, pointed out that the broadest material lesson to the United States in the European war is that army and navy forces are useless without superior air service.

"Command of the sea and command of the land," he stated, "are worthless without command of the air."

Peary declared that not an attack can be driven home on the European fronts without the use of aeroplanes. He told members of the league that the Jutland naval battle was dominated by the eyes of a dirigible.

Four foreign powers, probably six, he said, have the air equipment to enable them to destroy Washington or any of the great coast cities of this country in a single night. He declared the aeroplane to be the most efficient antidote for the submarine menace.

"To give the United States proper air power," he said, "we need a separate independent department of aeronautics with a place in the President's Cabinet; an aviation class of thousands and thousands of young men throughout the country; a comprehensive aero coast defense system, and a great central aeronautic manufacturing plant located in the interior of the country, where it can be protected to the last ditch."

The aeronautic movement was represented by the following Governors of the Aero Club of America: Alan R. Hawley, Rear Admiral Robert E. Peary, Henry A. Wise Wood, Charles Jerome Edwards, Raymond B. Price, and Henry Woodhouse.

Our Aerial Needs Outlined by Assistant Secretary Ingraham

THE aeronautical needs of the country were outlined as follows by Assistant Secretary of War William M. Ingraham, a member of the National Aerial Coast Patrol Commission, before the Galen Society, in Washington, D. C., on January 23:

"We are beginning to see the great need of airships. The European war has taught us that they are indispensable. I am glad to say that the appropriation of $13,281,666 made by Congress last year for an addition to the aviation corps of the United States army has been a wonderful step in this direction.

"At the beginning of the Mexican trouble the United States had only eight machines on the border, while at present there is a squadron of good serviceable aeroplanes on duty. Contracts have also been given out for 400 additional airships. There are 25,000 aircraft in the world today, and *England alone appropriated* $250,000,000 *for the aviation corps,* which makes our appropriation look very small. However, we are on the road to being a leading power in defense.

"One of the most important things we need today is the training of young men for the air service.

"We should be prepared to protect our country, because war clouds rise very rapidly, and there is no time to prepare after the blow has been struck. If an army were sent out unprepared it would be of little use and would be slaughtered; therefore, it is absolutely necessary for us to see that we are prepared to defend the country when the time comes. We have been going on without realizing that we must be prepared, and not until President Wilson made his trip west in the interest of preparedness last year did the people begin to consider it.

"Some people say that if war came 1,000,000 men would respond to the call. But how would we train and equip them? This idea of sending out unarmed troops is impossible, because conditions have changed.

"The United States is richer than all the European countries combined, but with all this power and wealth it means that we must protect it. We feel that we should insure our homes, and surely we should insure our country as well.

"Our pacifists think a great army would lead us into a war. I don't think it would. In fact, I do not think any country would dare cross swords with us if we were prepared. I do not know of any case in history where a large army has caused a war."

Conquest of the Air

(Editorial in Bangor (Me.) *Commercial*)

Henry Woodhouse, one of the board of governors of the American Aero club, gave an address before the American Civic association in Washington last week, in which he pictured the development of the aeroplane and the machines of the air. Mr. Woodhouse thinks that the era of air liners is upon us and mentioned aeroplanes that can travel 125 miles an hour and carrying a weight of 15 tons.

The war in Europe has given a remarkable life to aeronautics and has been marked by many developments so that few would refuse credence to almost any possibilities in this line. Mr. Woodhouse is a bit ahead of most of us but that does not necessarily make him incorrect in his views.

He says the conquest of the air is solved and there is really little to do before the liners of the air will be in operation. He states that financiers are ready to invest their money along this line and remarks that the time has arrived when in all city planning there should be provision for landing places for aeroplanes.

Mr. Woodhouse may be a little in advance, but he has probably read the future correctly. *It would be a foolish man who would today say that liners of the air will not ultimately come,* indeed before the war there was such Zeppelin transportation in Europe. How quickly such a means of transportation will be accepted by the public is another question. Much will depend upon the freedom from accident in the operation It will be a long time before the aircraft can rival the railroads as a method of transportation and yet *it was not many generations ago that we did not have the railroads.*

THE AVIATOR

Swift through the night I sped on vibrant wing,
The hooded death beside me slumbering,
And in my heart strange passions newly born.
Over the edge of night slow crept the morn,
And far beneath the patterned earth lay bare;
Fallow and field and forest, square on square,
Tiny and tenantless, while overhead
The crimson, sleepless meadows of the dead
Had sent their messenger. Onward I flew
Until I saw, and seeing, slowly knew
The gray roof where the singing rails converged.
A leaping flame of exultation surged!
The black death woke beneath my hand, and fell,
A sudden, swift ambassador of Hell,
Straight to its goal. The silence cried aloud
In agony, so shattered, and a crowd
Of lesser voices answered me in kind
With venomous tongue. Laughing, upon the wind
I rose . . . .
The earth fell from me like a falling stone.
I scaled the steep cliff of the sky, and stung
The swift machine to madness! Lo, I hung
Motionless in a world where nothing moved!
Distance was not and time had ceased to be!
Annihilated by eternity
Man's utmost effort failed! My startled soul,
Stripped of its passions, humbled, and made whole,
Drank a new wisdom from that endless sea
Of silence, and I trod eternity,
God's equal, and God's peace within my heart!
Downward at last. The uprising earth again,
The eager hands, the questionings of men,
And thunderous praise that roused no answering flame.
The deed they cheered, it was not mine to claim;
Somewhere beyond that farthest rim of cloud
The doer of the deed had found his shroud,
And the green crown they wreathed about my head
Was but a funeral token for one dead.

—Theresa Helburn in "The Bellman"

The News of the Week

Thomas Bros. Aeroplane Company and Thomas Aeromotor Company Absorbed by New Corporation

Confirming rumors that have been current for the past month, it is announced that a new Company, which will be known as the Thomas-Morse Aircraft Corporation, headed by Frank L. Morse, President of the Morse Chain Co. of Ithaca, N. Y., has purchased the assets of both the Thomas Bros. Aeroplane Co. and the Thomas Aeromotor Co. The organizations of the retiring Companies will be retained under the personal direction of Mr. Morse, who is well known in engineering and manufacturing circles generally, where the Morse Rocker Joint Silent Chain is extensively used for power transmission and camshaft drives for automobile motors. William T. Thomas, formerly the President of the Thomas Companies, will occupy the position of Vice-President of the new Company, and B. Douglas Thomas will continue as Chief Engineer in the Department of Aeroplane design. Jerome A. Fried, General Manager of the Aeromotor Co. in the past, will act as Secretary and Treasurer. Raymond Ware, who was formerly in charge of sales of both aeroplanes and aero-engines, will continue in this capacity, and also have general supervision of the advertising.

Plans are going rapidly forward for the building of new types of aeroplanes particularly suited for military and Naval purposes, and as soon as practicable additional facilities will be provided for their production on an extensive scale.

The personnel of the Engine Department, which will shortly move into a new and spacious concrete steel factory, remains the same. Harold N. Bliss will be in charge of manufacturing and George H. Abel will continue as Chief Engineer and have oversight of all experimental work. Much of the success that has attended the Thomas 135 H.P. Aeromotor, now well known to aeroplane manufacturers, is due to these two men, who combine experience covering over eight years in the development of high speed aeronautical motors. With the increased facilities offered by the new Aeromotor factory production will be materialy increased.

Packard Aeronautic Motor Tested.

The 200 h.p. aeroplane motor, built by the Packard Motor Car Company, was shown to the public for the first time in the Packard exhibit at the Detroit Automobile Show.

Until a few weeks ago this engine was kept under guard in the experimental department, and it was not until J. G. Vincent, vice-president of engineering, expressed himself satisfied with the result of tests and experiments that outsiders were permitted to see it.

The experimental section of the aircraft division has been at work on the engine for about a year. Mr. Vincent and W. B. Stout, engineer in charge of the aircraft division, are directing its development, under the observation of United States Army officers.

The new product of Packard design and manufacture is a twelve-cylinder engine of the V type, with the cylinders inclined at an included angle of 40 degrees, to provide for minimum air resistance. On its first dynamometer test the engine developed more than 200 h.p.

As a further means of testing the engine it was mounted on the platform of a two-ton truck, with the propeller projecting over the rear end. The force of the propeller sent the truck flying along at a rate of more than forty miles an hour. As there was no muffler attached, the racket of the staccato explosions attracted a considerable amount of attention in the vicinity of the Packard factory, before the police department ruled the big engine off the streets.

Technical Papers to be Read at S. A. E.

The first meeting of the society devoted entirely to consideration of aeronautic engineering subjects will be held at S. A. E. headquarters on the afternoon and evening of February 9th, the second day of the first Pan-American Aeronautic Exposition.

From this it should not be inferred that the papers to be presented will be of interest to aeronautic engineers only. No automobile engineer can afford to ignore developments in the aeronautic field of such vital importance in the national preparedness program, and of such commercial moment that it is expected that some fifty million dollars will be spent in this field during the current year.

The program will include an afternoon session devoted to consideration of aeronautic standardization subjects, with papers and discussion by engineers conversant with the needs and possibilities in this line of work.

Rear-Admiral Peary Delivering Daily Addresses on Air Power

Rear-Admiral Robert E. Peary, discoverer of the North Pole, who for the past two years has been devoting his entire time to the cause of national defense, and who has been educating the nation to the importance of air power—same as Admiral Mahan used to educate the nation to the realization of sea power—has been delivering daily addresses on the subject to different organizations in many parts of the country during the past week. He has delivered addresses to the Rotary Club of Brooklyn, the Wayne County Society, the Thirteen Club, the D. K. E. Fraternity, the Republican Club and the Explorers' Club.

Christofferson School Activities

Mayo H. Boulware, from Biggs, Cal., when he finishes his course of instruction at the Christofferson Aviation School will enter the professional field, and Larry Doncheski, from Mina, Nev., when his course is completed will join the allies in France.

Vice President Guy P. Slaughter of the Aero Club of America will shortly graduate a class of three: Miss Jean Doty, of Chico; J. O. Jensen, of Los Gatos, and Sam Mustain, of Los Angeles.

Aero Exhibits at Motor Boat Show

The Curtiss Company has a Type "F" flying boat and aero motors ranging from 100 to 300 h.p. on exhibition at the Motor Boat Show at Grand Central Palace, and the Sperry Gyroscope one of their ship stabilizers.

Army Men Fly 143 Miles

Capt. Ralph Royce and Lieut. H. C. Davidson of the army aviation corps, stationed at Columbus, N. M., flew to Douglas January 23 in a test flight. They covered the 143 miles in three hours.

Five other army planes were to have made the flight, but a heavy wind prevented them from starting. The entire distance was covered at an altitude of about 6,000 feet above sea level. The aviators suffered intensely from the cold.

Secretary Lane Makes Air Journey

Secretary Lane of the Interior Department made a flight recently over Newport News in an aeroplane from the Atlantic coast aeronautical station. He said he enjoyed the flight immensely. The secretary and Mrs. Lane were there to visit their son, who is studying aviation.

Cresswell Resigns from Thomas Co.

Egbert B. Cresswell has resigned as Secretary and Sales Manager of the Thomas Bros. Aeroplane Co., with which he has been identified since 1914. Mr. Cresswell has become President of the Universal Tire and Rubber Co., Inc., of Poughkeepsie, New York, which is forming automobile accessory branches throughout the East, and his many friends in the aeronautical industry wish him the heartiest success in his new business.

Canadian Aviation School Plans.

The announcement of the inauguration in Canada of aviation schools under Imperial army discipline is bringing forth many inquiries from young men anxious to serve in this branch of the arms. Lieut.-Col. Hoare, who will be in command of the reserve squadrons, sailed for Canada on January 6th, but in the meantime an officer of the Royal Flying Corps is looking over possible sites for the new schools. The Long Branch field may be utilized with certain improvements. It is expected that at least one school of considerable capacity will be ready for operation in the early spring. Sixty candidates for the cadet wing, created under the new regulations of the Royal Flying Corps, were recently taken on, and are about to leave for England to be trained there at the expense of the Imperial authorities. A number of these men are from Toronto. The strict adherence of the War Office to the age limit of twenty-five years bars many, otherwise very desirable applicants.

Admundsen Sails for Christiania

Capt. Roald Amundsen, discoverer of the south pole, sailed on the American liner Philadelphia on his way to Christiania to make final preparations for his aerial trip to the north pole.

Capt. Amundsen will witness the launching of his new polar ship at Christiania. The equipment which he has been gathering together in this country will be placed on the ship and the explorer will then return to the United States to procure the aeroplane in which he will make the final dash.

"Ideal conditions for flying prevail at the north pole," Capt. Amundsen said enthusiastically yesterday. "The atmosphere is clear and still. Many people think of the north pole as extremely cold, but it is much warmer in the summer time, seemingly, than it is at present on the deck of this ship. Only when the winds are high does one suffer from cold near the pole, and fortunately there is little wind around the pole.

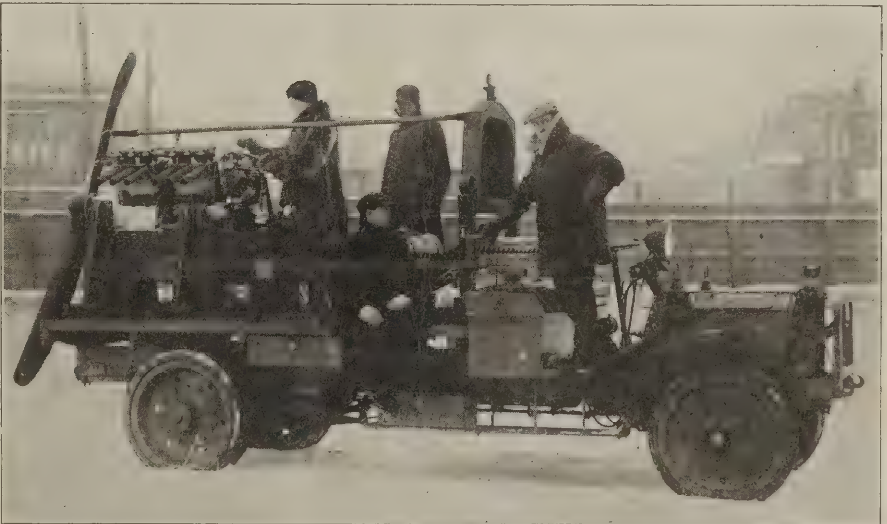
"There are no air pockets to disturb the balance of the aeroplane. The atmosphere is uniform in weight and is so clear that the human eye is like the lens of a telescope.

"I hope to fly all around the north pole, with my observer taking notes all the while. The trip is being made solely for scientific reasons."

Aero Mail from San Francisco to Sacramento?

Aerial mail service between San Francisco and Sacramento will be established soon if success attends plans now being made by Postmaster Charles W. Fay, of San Francisco; Thomas Fox, of Sacramento, and J. S. Roberts, superintendent of the railway mail service at San Francisco.

At the outset it is planned to have a high-power aeroplane, carrying first class mail only, make at least one round trip daily between Sacramento and San Francisco. The service would be increased as conditions warranted. The plan includes having an automobile awaiting the arrival of the aeroplane at its destination to carry the mail to the postoffice.



The 200 H.P. Packard aeronautical motor being tested at Detroit. With a wind propeller the truck made a speed of 40 miles per hour.

Señor Don Luis F. Mendizóbal, Minister of Public Works of the Guatemalan Republic, under whose office the Governmental aviation service is placed.

Army and Navy News

Brigadier-General George P. Scriven, chief signal officer, to be retired from active service February 13.

First Lieutenant Polk D. Brown, Medical Reserve Corps, to Memphis, Tenn., and report to commanding officer of aviation station for duty.

Captain Wiley E. Dawson (retired), assigned to active duty and detailed acting quartermaster, to Signal Corps Aviation School, San Diego, as assistant to quartermaster.

Lieutenant (J. G.) F. G. Reinicke, detached Naval Aeronautic Station, Pensacola; to Aylwin.

Captain Henry H. Arnold, junior military aviator, Signal Corps, from Signal Corps Aviation School, San Diego, to Canal Zone, to organize 7th Aero Squadron, and will assume command of that squadron.

Captain John F. Curry, junior military aviator, Signal Corps, from present duties upon expiration leave of absence, to Fort Kamehameha, H. I., to organize 6th Aero Squadron, and will assume charge of that squadron.

Captain John B. Brooks, junior military aviator, Signal Corps, from present duties to Fort Kamehameha, H. I., as supply officer of 6th Aero Squadron.

French Airwoman to Visit U. S.

Mlle. Helene Hutrieu, the young French aviator, who holds the Cross of the Legion of Honor for services to France; Elliott Cowdin, the American flier with the French army, and Prince Poniatowski are among those booked to sail for the United States aboard the Espagne soon.

Señor Mendizóbal

Señor Don Luis F. Mendizóbal, Minister of Public Works of the Guatemalan Republic and under whose office the Governmental aviation service is placed, is greatly interested in the new art. All official flights are performed under the supervision of Señor Mendizóbal, and he has never failed to be on the field at the appointed time for flying. Aviators regard his presence on the field as being of great importance to them, for his smile and his gentle remarks are very encouraging before starting and very pleasing and complimentary after alighting. Señor Mendizóbal understands quite some about the technicality of the art, as is noticed often by his enthusiastically made remarks expressing his appreciation of certain movements in the air which could be observed but by experienced men. Recently, while in the United States, Señor Mendizóbal visited aviation camps and inspected the different designs and makes of aeroplanes with the purpose of selecting the most suitable to meet with satisfaction the existing circumstances of climatic and atmospheric conditions which render great difficulty to flying in the Republic. Señor Mendizóbal has promised recently to lend his assistance in the organization of an Aero Club in Guatemala.

Burgess News

The Burgess Aeroplane Company of Marblehead, Mass., is again adding to its position of prominence in the aeronautical industry by the erection of an additional fireproof factory especially designed for the production of large seaplanes. This building will allow for the assembly and handling of machines equal in size to any yet conceived. This addition will almost double the size of the present factory and will enable a correspondingly increased production. Together with the present factory there will be in all approximately two acres of floor space. The Burgess Company will then be the second largest aeroplane factory in the world.

The new factory will be built in accordance with the most recent engineering practice, but will embody many innovations that have been worked out to fill the special requirements necessitated in this line of manufacture. It will contain over thirty thousand square feet of floor space under one roof and will be entirely unobstructed by any supporting pillars or side braces. This feature is taken care of by steel trusses which are supported and braced at their ends by concrete abutments. From the trusses will be suspended the elevated tracks and electric winches which will be used in moving the machines during the process of construction, as well as for launching when finally completed.

The situation of the factory also lends itself to this part of the work, it being situated directly on the water at the mouth of Marblehead harbor. This will do away with all the ordinary inconvenience and delay caused in transporting a machine from the factory to the testing grounds.

It is interesting to note the ingenious scheme which allows the water side of the building to be thrown completely open. This is accomplished by a combination of or series of sliding doors which when closed dovetail into each other, automatically locking and becoming airtight. When opened they slide on ball-bearing rollers to a position along the sides of the building, thus offering absolutely no obstruction.

The lighting problem as adapted to modern factories has been given special attention, this being very important in the maintenance of skilled workmanship. Indirect lighting, both in the artificial and natural, has been used. At no time is it possible for the light from the windows or arc lights to strike directly on any piece of work and so throw shadows. In all there will be nearly 1,000 windows, which will give an idea of the volume of light which will be defused through the building.

The equipment of machinery has also been very thoroughly gone into, many of the machines having been designed to special order. With this equipment the Burgess Company will be better than ever equipped to follow their practice of manufacturing under their own roof the many intricate parts which go into their complete product.

Herding Cattle by Aeroplane

To soar over the hills of Montana in an aeroplane in search of the "little black sheep which have gone astray," and to keep herds and herders located, will be carried out soon by J. Stanley Smith, of Martinsdale, a wealthy young sheepowner. This novel method of keeping in touch with the condition of his herds has long been a dream of one of Montana's best known young business men.

He believes that he will be able to cover five times the territory in a day with an aeroplane which he does now in an automobile in easier fashion and at the same time will be enabled to note the drift of his livestock, to locate strays and in many other ways avoid much trouble.

Mr. Smith owned the famous "Baby Doll," one of the first six-cylinder racing cars in Montana. It was entered in the State fair races several years ago.

Signal Corps Aviation Roster

We give below rosters of non-commissioned officers of the U. S. Signal Corps; name, date of rank and present station, corrected to Jan. 4, 1917:

SERGEANTS, FIRST-CLASS, SIGNAL CORPS.

Aviation Section.

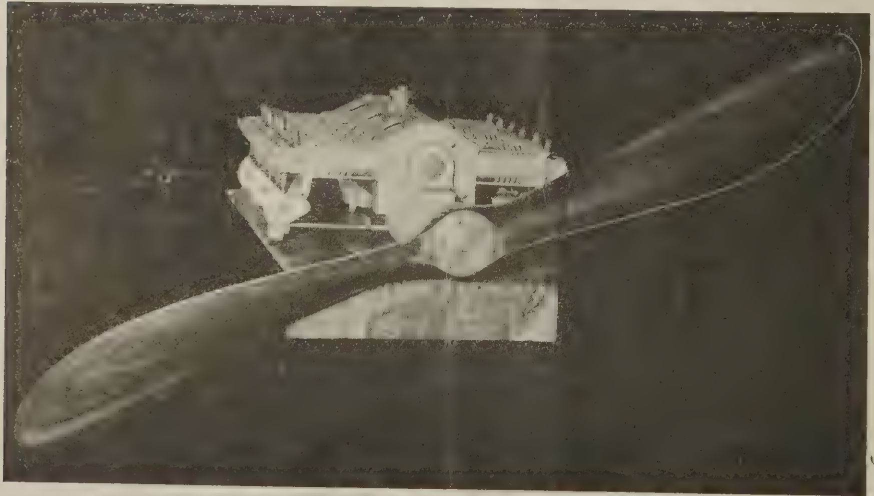
Evert L. Moore, July 1, 1904, Chicago, Ill.
Nemo S. Jolls, March 2, 1908, San Diego, Cal.
Isaac P. Blade, Nov. 2, 1911, San Diego, Cal.
George D. Litherland, Oct. 16, 1912, Philippine Islands
Charles Payne, Dec. 16, 1915, Southern Dept.
Samuel Katzman, Dec. 16, 1915, Southern Dept.
John W. Corcoran, Feb. 16, 1916, Southern Dept.
Walter Brewer, March 16, 1916, San Diego, Cal.
Fred Parkins, March 16, 1916, San Diego, Cal.
William C. Ocker, April 16, 1916, Washington, D. C.
Robert Robertson, May 16, 1916, Southern Dept.
Harry T. Lewis, Aug. 10, 1916, Southern Dept.
Arthur J. Ohm, Aug. 10, 1916, Southern Dept.
Arthur B. Neiswander, Aug. 10, 1916, Southern Dept.
Ernest Cote, Oct. 16, 1916, Southern Dept.
Clarence P. Young, Oct. 16, 1916, Southern Dept.
Alexander B. Culp, Oct. 16, 1916, Southern Dept.
Fritz Hinz, Oct. 16, 1916, Southern Dept.
Calvin T. Stevenson, Oct. 16, 1916, Southern Dept.
Ernest E. Hagelin, Nov. 21, 1916, Mineola, Long Island, N. Y.
Francis J. Vine, Nov. 22, 1916, Mineola, Long Island, N. Y.
James E. Carter; Nov. 23, 1916, Newport News, Va.
Leo C. Tobin, Dec. 1, 1916, Mineola, Long Island, N. Y.
Fred J. Scheidegger, Dec. 21, 1916, Southern Dept.
John Dolan, Dec. 21, 1916, Southern Dept.

Surveying by Aeroplane

Two new tools are to be added to the surveyor's outfit, when the suggestion of John W. Miller of the engineering department of the University of Washington is carried out. Those tools will be the aeroplane and the camera.

Professor Miller recently used photography and an aeroplane in establishing the harbor lines of Lake Washington. In a statement Mr. Miller said:

"The aeroplane, supplemented by the camera, would be a decided addition to the surveyor's equipment. A flight would help him to become acquainted with the territory through which he was working and would enable him to eliminate much unnecessary labor."



The twelve-cylinder Ashmusen aviation engine.

CHICAGO SIGNAL CORPS AVIATION ACTIVITIES

By Captain A. R. Christie, U. S. Army

AT the present time the Signal Corps Aviation Station, Captain Joseph C. Morrow, Jr., U. S. A., Commanding, which has been located at Ashburn, a suburb of Chicago, has all of its equipment packed and will remove to Memphis, Tennessee, for the Winter months.

This equipment consists of sixteen Curtiss JN4 tractor biplanes with Curtiss OX2 motors, three Packard trucks, one F.W.D. machine-shop truck, five motorcycles and one touring car with the necessary spare wings, struts, fittings, motor parts, etc.

In addition to Instructors Theodore C. Macaulay, Victor Vernon, J. D. Hill and E. A. Johnson, the Station will be accompanied South by Student-Instructors Baxter Adams, Chas. Pond, L. E. Holt, "Laddy" Laird, Fred Hoover, Harry Crewdson, Harry Powers, Wm. Couch, C. R. Sinclair, Louis Gerston, Elmer Partridge and Perah Maroney; 25 aviation students who have been enlisted as sergeants in the Aviation Section, Signal Enlisted Reserve Corps and who are applicants for a commission as Lieutenants in the Aviation Section, Signal Officers Reserve Corps; fifteen enlisted men of the Regular Army and twenty-five civilian aviation mechanicians.

Upon arrival at Memphis all Student-Instructors and Aviation Students will receive the following course of instruction in addition to training in flying:—

(A) A theoretical and practical course in aeronautics—commencing with simple measurements, nomenclature and care of machines, and ending with the trueing-up of machines.

This course will also include a history of aviation; simple experiments and calculations of models; standard construction; speed calculations; stress of different materials and a short course in shop practice.

(B) Field Service Regulations, U. S. Army.

(C) Minor Tactics.

(D) Infantry Drill Regulations, U. S. Army.

(E) Meteorology.

(F) Care of military aeroplanes in peace and in the field.

(G) Motors (Theoretical and practical course).

Principle of the internal combustion engine, also shop course in overhauling, repairs, and adjustments.

(H) Woodworking and the selections of woods.

(I) Installation and Adjustment of Compasses in aeroplanes.

(Cross-country flights will be made wherein the compass is used exclusively.)

(J) Military Map Reading. (To teach the student to make cross-country flights by map and compass.)

(K) Cross-country flying and Navigation of the Air.

(L) Radio-Telegraphy.

Before a student is allowed to take the Reserve Military Aviator's tests he must show that he is capable of handling a machine under any and all conditions—in stalls, skids, side-slips, etc.—landings *with* the wind, in cross-winds, and with dead motor. In addition great stress will be laid upon cross-country flying, it being intended to start off with short flights of from thirty to fifty miles and end up with the Station flying North to Chicago in the Spring, a distance of over five hundred miles.

Although it is realized that a finished military aviator cannot be turned out in five or six months, yet we expect those who receive their R. M. A. certificates to compare favorably with men turned out at the best European schools.

Captain James V. Martin, inventor of the Martin aerodynamic stabilizer.

Army and Navy News

A section of the first aero squadron, which has been encamped at El Valle, has broken camp and moved its aeroplanes to Colonia Dublan, according to reports from Columbus.

Sergeant Franklin K. Lane, Jr., of the Army Signal Corps, son of Franklin K. Lane, Secretary of the Interior, has been ordered to Newport News, Va., to practice flying it became known at the War Department. He will go to the Curtiss Aviation School.

Robert Matter, Signal Enlisted Reserve Corps, Fort Wayne, Ind., is assigned to active duty as sergeant in the Aviation Section, Signal Enlisted Reserve Corps, at the Curtiss Aviation School, Miami, Fla., to take effect Jan. 25, 1917. (Jan. 22, War D.)

Each of the following aviation students is announced as on duty that requires him to participate regularly and frequently in aerial flights from the date indicated after his name:

Capt. Guy L. Gearhart, C.A.C., D.O.L., Jan. 5, 1917.

Capt. John N. Reynolds, C.A.C., D.O.L., Jan. 9, 1917.

First Lieut. Thurman H. Bane, 6th Cav., Jan. 9, 1917.

First Lieut. Jack W. Heard, 17th Cav., Jan. 9, 1917.

First Lieut. Patrick Frissell, 11th Inf., Jan. 4, 1917.

First Lieut. Thorne Deuel, Jr., Cav., D.O.L., Jan. 4, 1917.

First Lieut. Warren P. Jernigan, Cav., Jan. 10, 1917.

First Lieut. Harry M. Brown, 22d Inf., Jan. 5, 1917.

First Lieut. John E. Rossell, Inf., Jan. 10, 1917. (Jan. 23, War D.)

A board to consist of Capts. Hiram A. Phillips, M.C., Thomas S. Bowen, Bert M. Atkinson and Carl Spatz, Aviation Section, S.C., and 1st Lieut. William F. Rice, M.C., at Fort Sam Houston, Texas, for the purpose of examining persons for appointment in the Aviation Section, Signal Officers' Reserve Corps. (Jan. 8, S.D.)

Five balloons have been added to the equipment of the Army Balloon School at Omaha, Nebr. Three are of the latest "observation" type, the purpose being to give the student officers every opportunity to become familiar with this method of signal and reconnaissance work. The request of Capt. C. DeF. Chandler, Signal Corps, U.S.A., who is in charge of the school, for an additional detail of officers and men will not be granted, it is learned, the school already having several more men than was planned for it by the General Staff.

Establishing a precedent by being the first aviator and owner of an aeroplane to enlist as a private in his country's military service, Charles E. Hays, cartoonist, reporter and birdman, this week joined the flying squad of the United States marines at the aeronautic station at Pensacola.

Col. William G. Haan, coast artillery, detailed to take field officers' course in aviation at Signal Corps Aviation School, San Diego.

Yale Aero Club Completed

Organization of the Aero Club of Yale has been completed. The object is to promote interest and knowledge of aeronautics in its many phases.

The War Department has requested that fifty men be raised from Yale for a summer course in aviation preparatory to examination for a commission in the aerial reserve corps. The Aero Club, to which all Yale students are eligible, will select the fifty men.

(*Continued from page* 533)

In general an aeroplane requires for its operation a personnel of 1 pilot, 1 observer, and 2 enlisted men, mechanicians, chauffeurs, etc.

In England 12 machines of different classes are assigned to a squadron.

19. ASSIGNMENT OF AEROPLANES TO ARTILLERY

Many are of the opinion that machines with the personnel to operate them should be assigned permanently to artillery regiments, so that they would be immediately available whenever action is required by the artillery. If they have to be obtained from a higher headquarters valuable time is often lost. It is believed that before long aeroplanes will be assigned permanently to regiments of artillery.

V. DEVELOPMENT OF AERONAUTIC PERSONNEL

20. GENERAL LINE OF DEVELOPMENT IN EUROPE

In the development of their aeronautical personnel all nations have worked more or less along similar lines. At first these detachments were attached to the engineers. All the pilots and observers were officers, while the mechanicians and others were enlisted men. As the science developed and more and more machines became necessary the importance of this branch constantly increased until eventually it formed a separate arm of the service.

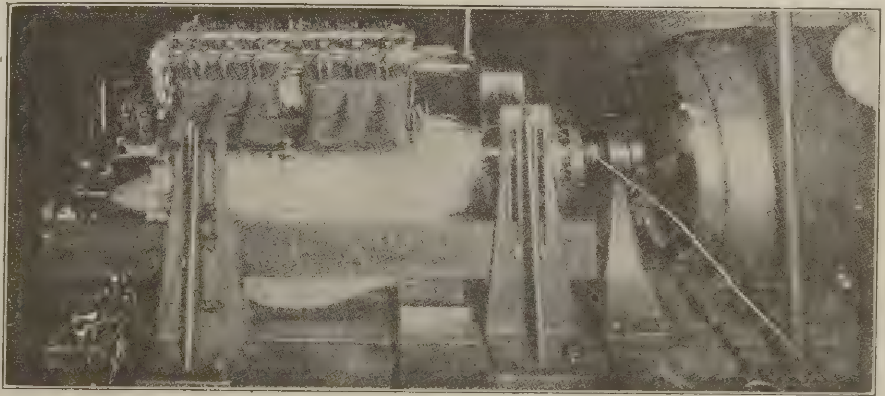
Instead of officers only being employed in the flying of the machines noncommissioned officers began to be used as the pilots.

21. OFFICER-OBSERVERS AND NON-COMMISSIONED OFFICER-PILOTS

The observers were either trained staff officers or officers of particular branches when the reconnaissance being made especially concerned a certain branch. For instance, in the observation of artillery fire an artillery officer, for the inspection of a demolished bridge over a great river an engineer officer, or for the observation of the tactical or strategical dispositions of an enemy's troops a staff officer. Noncommissioned officers are now very generally used as pilots. All countries now at war have found that they have places for all the trained pilots they can possibly obtain. In general the units are commanded by officers and a certain number of the pilots are officers, but the bulk of the piloting is done by enlisted men, while the officers are carried as observers.

22. LOSSES TO AERO PERSONNEL IN WAR

The losses to the flying personnel in war, when equipped with proper machines, seems to be less than that of infantry, cavalry and artillery in the order named.



The Packard aviation engine, which will be on exhibition at the Aeronautic Exposition, being tested on a dynamometer in Detroit.

THE WRIGHT-MARTIN MODEL V

THE Wright-Martin Model V is a two-place tractor biplane of 150-horsepower, designed for long-range military reconnaissance, with the observer's cockpit well forward of the entering edge of the lower wings.

The power plant consists of a Simplex Model A Hispano-Suiza eight-cylinder, water-cooled engine (name under the Birkigt patent), driving direct a two-bladed tractor screw. The propeller is equipped with the French standard hub, keyed and locked to the tapered crankshaft extension.

The motor unit is located in a demountable nose compartment of tubular and pressed steel construction, enclosed with hammered sheet aluminum bonnet fitted with large doors and louvred ventilators. The fuselage entry is formed by the oval German silver cellular radiator located immediately back of the propeller. The radiator is supported by novel means directly on the pyramid motor mounting, with a suitable vibration-absorbing medium interposed. An oil radiator is located flush with the under cowl and connects with a separate oil tank of four gallons' capacity in the rear of the engine compartment.

The wings are staggered and have a slight dihedral angle. They are of the one-piece type, three sections comprising the upper plane and two the lower wings. Wings have hinged ends and are locked together with nickel steel q. d. pins. The curve is the Vought No. 4, developed to meet the, requirements of maximum efficiency, wide speed range and structural safety. It has been thoroughly tried out in actual service and its attributes proven. A noteworthy characteristic is the minimum translation of the center of pressure throughout the useful range of incidence angles.

The chord is the same for both planes and a differential incidence setting is used. The curve permits of the employment of two very substantial spruce I section main spars and a third stringer spar of the semi-continuous built-up type, the latter disposed between the main beams to increase the wing strength and serve as an aligning member for the ribs themselves. The ribs are of the built-up type, bench-made to metal patterns to insure uniformity and interchangeability. Rib materials are spruce for battens and poplar for webs, the assembly carefully glued up and brass nailed. Wide box ribs are used at all panel points and light false nose ribs of spruce are employed between the main ribs. All ribs are re-inforced to strengthen them in longitudinal shear.

Leading edges are of spruce, hollowed, while the trailing edges are of white ash. Wing top bows are of bent ash, hollowed and maple-dowelled to the spars and nose pieces. The lower wings are fitted with wide rubber stripped contre-plaque sidewalks at the roots and have comfortable hand-hold grips adjacent to the rear spars at the tips.

All woodwork is given one coat of wood filler and two coats of waterproof varnish; metal parts three coats durable enamel, baked on..

The wing covers are made from uncalendered Irish linen of approved specifications, sewed and laid diagonally. The fabric is secured to the ribs by sewing and tacking and re-inforced with suitable linen taping.

The cloth is treated with five coats of Wright-Martin doping mixture and finished with two coats of Glidden special flexible waterproof varnish.

In the cellule the interplane struts are of solid spruce, streamlined and tapered and are fitted with pressed steel socket ends. Fittings are stampings from chrome vanadium steel, baked enamel finish. Turnbuckles are of the clevis-and-pin type, with nickel steel shanks and bronze barrels. All wires, struts and similar components are quickly detachable by removing nickel steel lock pins and render assembly or replacement easy and very quick. Wire and turnbuckles are enamelled for preservation against weather. The cable used is Roebling's stranded. All eyes have saddles and are copper served and soldered. The lower wing trailing edges next the fuselage and the center section are cut away to facilitate the pilot's view.

Four large ailerons are hinged to the rear spars, employing a semi-closed gap. Aileron frames are spruce and tubular steel, carefully re-inforced. The covering and its treatment are the same as the wings. Three hinges per aileron are employed and a very simple and direct aileron control is used, utilizing the streamlined spruce interaileron struts.

The body is of the two-place one-piece type. It is flat-side, fully enclosed and accommodates pilot and passengers in well crowned and padded tandem cockpits, the pilot being placed in an advantageous position in the rear cockpit. A special feature is the detachable nose.

This fuselage, or body, houses the motor, fuel and oil tanks, equipment and supplies and the live load in well arranged compact individual compartments. The fuel tanks are removed from proximity to the motor compartment to minimize fire risk, the service tank being located in the cowl aft of the front cockpit. The main tanks are placed longitudinally and to the rear of the front seat in padded floor cradles. Fuel is supplied by pressure. The air pump integral with the motor serves the system except for starting.

Cockpit rims are padded and leather-covered, while the cockpits are upholstered in leather. Woodwork is varnished throughout and fittings are enamelled and baked.

The body tapers aft of the wings to a vertical tubular knife edge at the rear which serves as an anchorage for the fin and rudder assembly. It is constructed, with the exception of the steel motor mounting, of ash and spruce longerons, struts and cross members, amply braced with Roebling's vanadium steel wire and Wright-Martin short type turnbuckles. The fittings are substantial throughout and in the main are steel stampings, embossed and die-formed from special steel. A substantial system of "follow-through" has been detailed into the fuselage design forward.

The rear cockpit is fitted with Dep standard control of wheel column and foot rudder bar. On the dashboard are neatly grouped the various flight and mechanical instruments, including altimeter, slip indicator, air speed meter, clock, oil and air pressure gauges, tachometer, thermometers, primer, shut-off valve, hand air pump and ignition switches. Transparent wind shields add to the comfort of pilot and passenger.

Forward the fuselage is sheet aluminum enclosed while rearward linen fabric is employed with provision for quick inspection of the truss members by means of a detachable deck. A large door renders the enclosed skid mechanism get-at-able.

The chassis is of the two-wheeled type and is designed to greatly minimize resistance. This component is readily demountable as a unit or individual parts may be disassembled with a minimum of inconvenience and disturbance of adjacent members. Practically all the parts are removable through the agency of q. d. nickel steel lock pins of large diameter. The chassis is composed of two sets of substantial ash "V" struts of stream-line section, combined with a stream-lined system of twin parallel steel spreader tubes attached to the steel boxes at the apices of the paired struts, and an improved wheel and axle assembly. The whole unit is cross-braced with heavy cable and corresponging turnbuckles and fittings. The chassis struts are attached to the fuselage with suitable steel clip-and-pin fittings.

The spreader tubes, or horizontal compression members, are of large diameter and are fitted with forged q. d. clevis ends, pinned and brazed in. This member supports, and with its sheet aluminum streamline houses the axle hinged at the center, the spreader and axle hinge load being carried by two diagonal steel cables running up to the fuselage forward attachment plates. The axles are nickel steel tubing, specially heat-treated. The outside diameter is large, with a substantial wall thickness suitably reinforced at points of greatest load.

Either axle member can be withdrawn through its shock absorber spool without affecting the adjustment of the shock absorbing mechanism. Axle hinge pins are quickly get-at-able by removing a small plate on the housing.

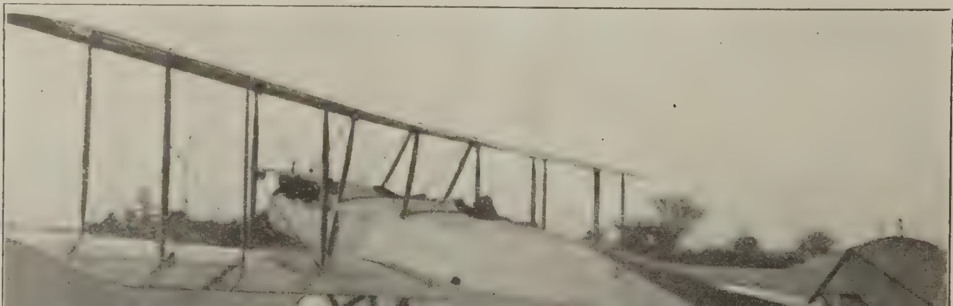
The shock absorbers are cotton encased rubber cord of large diameter, approximately ten yards being used for each axle, and the strand is laced over and retained by belled steel spools of demountable construction. The wheels made in the Wright-Martin factory are of very sturdy construction, yet reasonably light, because of their sound design. They are shod with 26 x 4 inch Goodyear double-tube tires. Wheels have specially designed hubs with pressed steel flanges shrunk on, the spoke rows being more than 6 inches apart. The spokes are heavy gauge, of best quality steel, 36 being used to each wheel, tangent laced.

Bronzed bushings are fitted and the hubs are self-lubricating, with grease capacity for a full season's use. Hexagonal bronze hub caps screwed on and pinned are used to hold the wheels in position.

An interesting detail is the method of stream-lining the wheels which does not necessitate the usual objectionable discard of the fabric casing on removal. The air valve is accessible through a small circular aluminum door in the casing, which latter is of the same material as the wing covers, similarly doped and finished. The wheel tread is 5 ft. 3.5 inches, or slightly more than 1/7th the span of the lower wing. The weight of the complete chassis, including disc wheels and shock absorbers, is but 86 lbs.

A tail skid of low-head resistance protects the rear of the machine. This is of substantial ash construction, operating semi-universally against the tension of the rubber shock absorber coils, enclosed within the fuselage. The skid floats on a reinforced tubular steel cross-strut and is aligned by heavy helical springs concentric with the strut. A large aluminum door in the side of the fuselage allows easy inspection and adjustment of the skid mechanism, and this construction has reduced the resistance of this component to a minimum. The skid is shod with a bronze shoe which is secured in place by bolts and readily replaced when worn out. A least ground clearance of 7 inches under the fuselage sternpost is still allowed when the skid reaches its vertical travel limit. No empennage brace anchorages are tolerated in connection with the skid or sternpost.

The empennage consists of a moderately doubled cambered fixed horizontal stabilizer of high aspect ratio, to which are attached the



Wright-Martin Model V tractor biplane equipped with Hispano-Suiza motor.

Wright-Martin Model V.

dual elevators, the unbalanced rudder and the fixed vertical fin. The design of the empennage enables the units to be very quickly assembled, the chief novelty being in the system of interlocking the various parts and the minimized external bracing required to adequately support the surfaces to the fuselage structure. But four streamline steel tubes are required, two from the fin downward to the rear spar of the stabilizer and two diagonally forward from the stabilizer to the fuselage lower longerons. These braces, like the struts and other components noted above, are fitted with approved clevis ends and are locked in place with nickel steel pins. All elevator and rudder ribs are carefully sparred and these surfaces provided with a light spruce spar disposed ten inches forward of the trailing edge to aid in equalizing the load on the ribs themselves. Bracing wires anchored on or in proximity to the trailing edge are not used, and the control arms are designed to eliminate brace wiring as much as possible. In the elevators light bracing wires are suitably anchored to the reinforcing spruce stringer. The frames of the tail components are made entirely of cold-drawn, seamless steel tubing of various sizes and thicknesses, and in some cases of special section, depending on the function of the particular part. Steel members are joined by special forged or drawn steel fittings pinned in place and then brazed. No welding operations whatever are employed in making up the empennage frames. All ribs and spars are attached to the tubular frame members by sheet steel socketing clips tangent brazed in place. The internal cross bracing is principally the wire and fitting system employed in the main planes, though four light sectioned spruce diagonals are used in addition. The stabilizer rib structure is constructed over an I-section spruce spar of large section located laterally 1 ft. 2 inches back from the entering edge. By the use of this substantial spar all external bracing to the forward part of the horizontal stabilizer has been eliminated and the necessary depth of section is provided for the double cambered profile. Elevator and rudder hinge details are steel stampings pinned and brazed in place. These are provided with means for lubrication and the areas are unhinged by withdrawing quick detachable pins. Quarter-inch nickel steel bolts and steel jaw clips attach, respectively, the stabilizer front spar and entering edge to the fuselage. The rear spar is secured by two 3/16th inch bolts and the whole assembly locked by the fin extension which telescopes into the fuselage tubular sternpost, there secured by a lanyarded taper pin. The whole system is then interbraced by the streamlined tubing outside stays, which are so located and calculated to take all the empennage drift, control thrust and vertical loads.

The control areas are operated through doubled control cables, changes in direction being taken care of by substantial chains passing over pressed steel pulleys of very novel design. An enclosed rock shaft is disposed in the elevator control mechanism back of the pilot's seat to eliminate any lost motion and the usual crossing and slacking of these control wires. Pressed steel control arms are fitted to all rear control surfaces. All wires are readily removable by withdrawing nickel steel lock pins, and all control wire adjustments can be made from the cockpit. Satisfactory provision for lubrication has been provided throughout.

Exposed metal parts are enamelled, baked (over heavy anti-rust plating), of color selected to harmonize with the general finish scheme. Standard finish for exterior wood parts is one coat of wood filler and three coats of waterproof varnish, or paint and varnish to color desired.

GENERAL SPECIFICATIONS.

Span of upper plane	39 ft. 8.5 ins.
Span of lower plane	39 ft. 8.5 ins.
Over-all length	27 ft. 2 ins.
Over-all height	9 ft. 5.5 ins.
Chord of upper plane	5 ft. 9.5 ins.
Chord of lower plane	5 ft. 9.5 ins.
Curve of upper plane	Vought No. 4
Curve of lower plane	Vought No. 4
Cap between upper and lower planes	5 ft. 7 ins. (mean)
Stagger	1 ft.
Dihedral angle	1 deg. 15 min.
Area of upper plane, exclusive of ailerons	223.2 sq. ft.
Area of lower plane, exclusive of ailerons	206.8 sq. ft.
Area ailerons (4)	64.6 sq. ft.
Area horizontal empennage	57.2 sq. ft.
Area vertical empennage	17.37 sq. ft.
Span of empennage	11 ft. 11 ins.
Area total supporting surface, inclusive of ailerons	430 sq. ft.
Loading per sq. ft	5.86 lbs.
Loading per b.h.p	16.86 lbs.
Weight of aeroplane, without power plant, fuel or load, but including main planes, fuselage, fuel tanks, chassis, control and auxiliary surfaces, instruments	1130 lbs.
Weight of power plant, including motor complete with radiator, cooling water, propeller, starting handle and other accessories, but without gasoline or oil	595 lbs.
Useful load, including pilot (165 lbs.), observer (165 lbs.), luggage, parts, supplies, etc	445 lbs.
Fuel load, gasoline and oil for six hours' flight at full power	460 lbs.
Total gross weight	2630 lbs.
Motor	Simplex Model A Hispano-Suiza
Horsepower	150-h.p. at 1450 r.p.m.
Propeller	Oak
Diameter	8 ft. 4 ins.
Pitch	5 ft. 7.5 ins.
Direction rotation	Counter-Clockwise
Control	Dep
Standard equipment	Motometer, J. M. fire extinguisher, tool kit, assortment of fittings and parts, propeller and cockpit covers, extra wheel and propeller, instruments as follows: slip indicator, air speed meter, altimeter, clock, oil and air pressure gauges, tachometer, thermometers, primer, shut-off valves, hand air pump and ignition switches.

Three-quarter front view Wright-Martin Model V.

MILITARY AVIATION

A Study Prepared in the War College Division, General Staff

Reprinted from *Field Artillery Journal*

I. INTRODUCTION

1. RELATION OF AVIATION TO THE MILITARY SERVICE

In this paper it is proposed to consider various aeronautical appliances in regard to their practical value in campaign, as shown by such data as are now available from the theatre of war in Europe.

In its relation to the military service, aviation today may be regarded as embracing all aerial appliances, such as heavier-than-air-craft, dirigibles lighter-than-air-craft, and non-dirigibles or captive lighter-than-air balloons, together with the personnel necessary for their operation and management.

2. USE OF AIRCRAFT ON OUR COAST AND WITH OUR MOBILE LAND FORCES

In considering this subject account should be taken, first, of the use of aircraft of various types along and beyond the coasts and frontiers of the United States upon the outbreak of war; second, the use of aircraft in the Army by the mobile forces; third, the use of aircraft by our over-sea garrisons.

In addition to the battle fleet and units of the Navy designed to take the offensive on the high seas, the waters contiguous to the coast line of the United States are organized into naval defense districts. These cover certain sections of the coast line and contain patrol vessels, both surface and subsurface, and aircraft for reconnaissance purposes. These are essentially for the purpose of finding out and locating hostile vessels which are approaching the coast and of determining their strength, dispositions, and probable intentions.

Added to the strictly naval formations included in the naval defense districts, in time of war the United States Coast Guard (in peace under the Treasury Department) passes to the control of the Navy.

The Coast Guard, in addition to its boats and revenue cutters which will be utilized as patrol vessels, embraces the Life-Saving Service. The latter has stations more or less regularly distributed along the coasts which are connected by telephone lines. They are also equipped with visual signaling appliances to communicate from shore to ships. The Navy maintains a chain of radio stations along our coasts and over-sea possessions.

The naval defense districts become of great importance in case that the main battle fleets are defeated or in case they are operating at a great distance. Therefore, when an enemy expedition breaks through the naval defense and approaches the coast with a view to forcing a landing the resistance to such an expedition becomes primarily a function of the Army.

The defensive formations of the Army consist of the harbor defenses and accessories and the mobile units. The harbor defenses consist of fixed and mobile gun defenses and mine defenses; also obstacles both on land and in the waters. The aircraft required in connection with the harbor defenses should consist of machines used for one or more of the following purposes:

(*a*) For reconnaisance—that is, to determine the strength, dispositions, and probable intentions of the enemy.

(*b*) For preventing hostile aerial reconnaissance.

(*c*) For destroying hostile aircraft and for offensive work against enemy submarines and other vessels, including the interruption of enemy submarines and other vessels, including the interruption of enemy mining or countermining operations.

(*d*) For aiding in spotting the fire of Coast Artillery, both against ships and against any invading force that may invest the seacoast fortifications.

The number and character of the aircraft required depends on the locality, number of harbor defenses, their organization, their strength, and positions. Each harbor-defense area, therefore, needs to be studied with this specific end in view, and should have radio apparatus not only for communicating with the Navy but also for communicating with its aircraft and with the units of our mobile forces.

In addition to the aircraft required with the harbor defenses themselves, aircraft are required with modern movable coast-defense armament employed as an auxiliary element of the mobile forces in defending the intervals between our fortified harbors and with units of the mobile forces.

The use of aircraft with the mobile units is a definite matter; each division requires one squadron of twelve aeroplanes. These are divided into three companies of four aeroplanes each, two companies having reconnaissance and artillery observation machines and one company having two high-speed machines especially constructed for long-distance reconnaissance and for combating the enemy's aerial craft; two battle machines for the purpose of bomb dropping and offensive work against enemy material of all sorts. This is in keeping with the best practice that has been developed in the European War.

3. USE OF AIRCRAFT AT OUR OVER-SEA STATIONS

The use of aircraft with the Army in the over-sea possessions is analogous to that mentioned above with the harbor defenses; and in addition, wherever mobile units of the Army happen to be, they must be provided with suitable aircraft. The defense of over-sea possessions constitutes a problem in itself, and these garrisons must be equipped not only with machines capable of reconnaissance over land, but also with those capable of operations over water, with the power to alight in water—that is, hydroaeroplanes.

The type of machine to be used necessarily depends on the locality; for instance, in Hawaii practically all of the military machines would need to be hydroaeroplanes; in the Philippines and Panama a great proportion of them. To the Coast Artillery troops in the United States proper and in the districts around the Great Lakes the same considerations apply. It is believed that the main principles enunciated above should be followed, and that an estimate of actual machines and material, both heavier and lighter than air, should be made for all places.

II. GENERAL TYPES OF AIRCRAFT

4. CAPTIVE BALLOONS

For over a century captive balloons have been used by the armies of all the leading military nations. Their function has been one of observation, that is, to see what those on the ground were unable to see. They have therefore proved a useful means of observing and reporting the effects of artillery fire. Electrical means of communication greatly enhanced the utility of captive balloons, as it made communication instantaneous from car to ground instead of by the older way of raising and lowering written messages by ropes. In clear weather and on favorable terrain captive balloons are able to distinguish different branches of the service at a distance of 16,000 yards or about nine miles. With the best glasses at the present time the field of observation is said to extend to 20,000 yards. In general, captive balloons of the "Sausage" or "Drachen" type are used by all the armies of the great nations. Along the French-German front in northern France these balloons are used in great numbers all along the lines. Their function is to observe the fire of artillery and keep watch of all movements of hostile parties within their field of view. They are connected by telephone directly with the batteries whose fire they are observing and with the headquarters to which they are attached. In many cases the captive balloons work in conjunction with aeroplanes. The aeroplanes by flying over the terrain where the hostile targets are located find out the exact position of those which the captive balloons have been unable to locate by themselves. When by means of signals the locations of the targets have been indicated to the observer in the captive balloon, the aeroplanes proceed to other duty. Aside from the use of the captive balloons in conjunction with aeroplanes, their duties are practically the same as they have been for many years or were in our own Civil War. Free balloons such as were used from Paris, for instance, in 1870, are now a thing of the past, their place having been taken by the aeroplane or the dirigible airship. All military captive balloons are now so constructed that their undersurface acts like a kite, thereby making them steady in a strong wind. To keep the envelope distended properly in the face of the wind, a wind sail is provided so as to transmit pressure to the rear part of the envelope by means of the wind itself. Captive balloons are used not only with the field forces, but also are especially useful in fortress warfare. The organizations which handle these balloons consist ordinarily of some 4 officers, 72 men for each balloon section.

5. DIRIGIBLES

The term dirigible, as applied to aeronautical appliances, signifies a lighter-than-air craft, which is equipped with engines and propellers capable of moving it from place to place. Dirigibles may be roughly divided into three classes: Non-rigid, or those whose envelope can be entirely packed into a small space when deflated, and that have no rigid framework of any kind; semi-rigid, or those that have a stiffening for a part of their length in order to enable the envelopes to maintain their shape to better advantage than the non-rigid; the rigid, which have a framework for the whole envelope that maintains itself continuously. All have been tried for the last fifteen years. The non-rigid types have not given very good results, as they are too much dependent on the weather, due to distortion of the envelopes; the semi-rigid have given some satisfaction and have been largely employed. The advantage of the semi-rigid types is that they may be packed for shipment and reassembled much more easily than the rigid types; they can be deflated quickly and, consequently, are not so subject to complete destruction as the rigid types when anchored to the earth. On the other hand, they are not able to develop the speed that the rigid types, such as the "Zeppelin," are capable of.

Dirigibles and aeroplanes are frequently compared with each other as to their utility in general. As a matter of fact, they are two entirely different military accessories and are as different in many ways as is a captive balloon from an aeroplane. Dirigibles are able to stay in the air at any height for long periods of time. They are capable of running at reduced speed, can hover over localities for minute observation and to take photographs. They are able to carry several tons' weight in addition to their passengers and crew. From the fact that they are able to remain stationary over a given place they are able to launch their projectiles with greater accuracy. Dirigibles in the present war have been used both over land and sea. At sea they have carried out reconnaissance, have acted offensively against hostile submarines, have accompanied transports in order to observe the approach of hostile craft, have been used in mine laying, stopping and examining hostile merchant vessels at sea, and for bombarding hostile localities. The airships which have made the longest trips and developed the greatest efficiency thus far are the German "Zeppelin" rigid-frame type. These have repeatedly flown over England at a distance of at least 300 miles from their base, and have nearly always returned in safety. Some have been lost, however. Aeroplanes appear to be unable to cope with them at night. While dirigibles have not proved themselves to be a determining factor in combat, either on land or sea, they are being developed to the greatest extent possible, especially by the Germans, who have dirigibles of very great size. The principal features of this type are a rigid framework of aluminum, a number of drum-shaped bas bags, and a thin outer cover. Although the details of construction are not definitely known up to date, their length is about 485 feet, their volume about 900,000 cubic feet, their total lift over 20 tons, and their useful lift about 5 tons. They are driven by four motors of a total horsepower of about 800, which is applied to four propellers. Their speed is from 50 to 60 or more miles per hour and a full-speed endurance of over 100 hours, or more than 4 days. It is therefore evident that in good weather these airships have a radius of action of from 5000 to 6000 miles. Moreover, they are being constantly improved, and are probably capable of crossing the Atlantic Ocean. Crews of from 10 to 20 men are required for their operation; they are armed with bombs of various sorts, light guns, and are equipped with searchlights. They carry very efficient radio apparati, which have equipments for determining the directions from which radio impulses are being sent. In this way they are able to locate themselves at night or in foggy weather when the ground is invisible. They require very large and expensive hangars, gas plants, and equipments for their operation. When forced to make landings outside of their hangars, on account of their bulk, they are very difficult to handle in hard winds, and are liable to destruction thereby.

The best of the non-rigid and semi-rigid airships have a capacity of more than 800,000 cubic feet, a maximum speed of 50 miles per hour or less, and a full speed endurance of about 24 hours. As mentioned above, their great asset is extreme portability and cheapness as compared with the rigid type.

6. AEROPLANES

Heavier-than-air craft made their appearance as military agencies in 1908, when the Wright brothers demonstrated thoroughly their possibilities in this respect. While many of the salient features of heavier-than-air machines had been worked out years before, it remained for the internal-combustion engine to really make mechanical flight possible. The military possibilities of aircraft of this description were appreciated immediately by the great nations. Large appropriations were made at once, notably by France and Germany, for their development. At first England was slow to take up the matter, but in 1912 had gone at it thoroughly and was spending large amounts of money for their development. Italy, Russia, Japan, and the smaller nations of Europe and South America made liberal appropriations for obtaining the material and developing the personnel. Aeroplanes were used in a small way during the Italian campaign in Africa during the Balkan-Turkish War, and during the Balkan War. These nations had very little equipment and very few trained flyers. Wherever the aeroplanes were given the opportunity, under average conditions they rendered efficient service in reconnaissance.

7. TYPES OF AEROPLANES

We now find aeroplanes consisting of three principal classes: (*a*) Scout or speed machines; (*b*) reconnaissance aeroplanes; (*c*) battle machines. The first are used for distant reconnaissance and combating the enemy's aircraft, the second for ordinary reconnaissance and the observation of fire of artillery, and the third for the destruction of enemy's material, personnel, or equipment.

8. REQUIREMENTS OF VARIOUS TYPES OF MACHINES

Great advances have been made since the war began in all these machines, all the details of which are not yet available. The following table, which appeared in the *London Times* of February 19, 1914, gives the approximate requirements of each type of machine at the beginning of the war. These general characteristics are still desired, but the radius of action and the speed have been considerably increased:

9. AEROPLANE ENGINES

As to material, the most important consideration in aeroplane construction has been the engine. Without excellent engines the best aeroplanes otherwise are of no service; in fact, may be a source of danger. In the countries where aeroplane development has made the most progress large prizes have been given for the development of suitable engines. At the same time, research and experimentation have gone on along this line at Government plants. Engines require frequent replacement. In fact, it is reported that after 100 hours in the air engines are "scrapped" and new ones installed. The plan found to give excellent results for the development of material is for the Government to have stations where experimentation along all lines is carried on. On the data furnished by these establishments specifications are made up for the construction of aircraft by private individuals and civil manufactories. If any parts, such as the engines mentioned above, need additional development, prizes are offered to stimulate construction and progress.

III. FUNCTIONS OF AIRCRAFT

10. HEIGHT AT WHICH AEROPLANES MUST FLY

It was soon found out that to escape the fire of small arms a height of about 4000 feet above the ground had to be maintained. As soon as balloon guns were created this height had to be increased to 6000 feet, at which height it is now necessary to fly in order to be reasonably safe from being hit by hostile projectiles sufficient to bring the machine down. At this height, 6000 feet, small details of the terrain and small detachments of troops or material are very difficult to distinguish. On the other hand, large columns of troops, trains, railways, bridges, artillery firing, and sometimes in position, defensive positions of large extent, and things of that nature can be readily distinguished. Whenever it becomes necessary for the aircraft to fly at a lower altitude than 6000 feet the chance of destruction by gunfire must be considered.

11. STRATEGICAL RECONNAISSANCE

Reconnaissance of this kind is strategical in its nature, the tactical reconnaissance of particular localities is still carried out by troops or captive balloons. In fact, it may be said that all strategical reconnaissance is now carried on by aircraft. The reconnaissance is carried out by an officer who requires considerable experience in order to be able to distinguish objects on the earth and assign to them their true military value. The pilot is either an officer or noncommissioned officer. The observer is always a trained tactical officer, because in reconnaissance of this nature an untrained person can not interpret the military significance of what he sees.

12. PHOTOGRAPHY FROM AEROPLANES

Photography is utilized to the greatest extent possible in aerial reconnaissance. The devices are so arranged that they are capable of taking one or a series of views of a particular locality. The plates or films thus made are rapidly developed and are thrown on a screen by means of a stereopticon, when all details are magnified to any extent desired and details invisible to the naked eye are brought out plainly. These details are then entered on the maps of the officers concerned. As the height at which an aeroplane is flying can be taken from the barograph, and as the focal angle of the lens of the camera is known, a scale can easily be worked out and the views form good maps of the terrain photographed.

13. AEROPLANES AND ARTILLERY

In addition to reconnaissance in general, aeroplanes have taken their place as a fixture for observing the fire of artillery. Due to the degree of concealment which artillery is now given, it is impossible to determine its location from the ground. The aeroplanes first pick up the targets, report their location to the field artillery, and then observe the fire of the batteries. By means of prearranged visual signals or radiotelegraphy the aeroplanes are able to indicate to the artillery where their fire is making itself felt. If artillery is insufficiently provided with aeroplanes, it is well established that an enemy so provided has an overwhelming advantage.

14. CONTROL OF THE AIR

For this reason, among others, attempts to gain "control of the air" are made by belligerents at the inception of hostilities. This takes the form of offensive action by aeroplane against aeroplane. For this purpose machines known as "speed scouts" and "battle aeroplanes" have been developed. All the great European nations are now equipped with them. The only way in which enemy aeroplanes can be effectively dealt with is by aeroplanes, because they are difficult targets for gun-fire from the ground. To gain control of the air a great preponderance in number and efficiency of aircraft is necessary So far in the European War, unless one side had a greatly preponderating number and quality of aeroplanes, they have been unable to obtain and keep control of the air. An excellent instance of obtaining control of the air seems to be furnished by the Austro-Germans when they initiated the campaign against the Russians in May, 1915. In this instance complete control of the air appears to have been obtained. The results to the Russians were disastrous because the Austro-Germans were able to fly at will wherever they wanted to, could pick up the location of the Russian masses, and make their movements accordingly, entirely unobserved by the Russians. In the fire of their artillery they had the advantage of being able to locate the Russian guns and observe their own fire, while the Russians were powerless to do so.

In an article on "Recent Progress on Military Aeronautics," published in the *Journal of The Franklin Institute* for October, 1915, Lieut. Col. Samuel Reber, Signal Corps, United States Army, sums up the question of machines for control of the air as follows:

"Experience has developed three types of aeroplanes for military purposes: The first, the speed scout, for strategical reconnaissance, a one seater, with a speed up to 85 miles per hour and a radius of action of 300 miles and a fast climber, about 700 feet per minute; the second for general reconnaissance purposes with the same radius of action, carrying both pilot and observer and equipped with radiotelegraphy, slower in speed, about 70 miles per hour, and climbing about 500 feet per minute, and in some cases protected by armor; the third or fighting craft, armored, and carries in addition to the pilot a rapid-fire gun and ammunition and so arranged as to have a clear field of view and fire in either direction up to 30 degrees from the line of flight, the speed to run from 45 to 65 miles per hour, and the machine to climb about 350 feet per minute."

15. SURPRISE MOVEMENTS

It is often said that due to the use of aeroplanes surprises are no longer possible. Generally speaking, this is so, providing both sides are equally well equiped with machines and weather conditions are favorable. If, however, complete "command of the air" is obtained by one side, the chances of surprising the enemy are greater than they have ever been before.

16. BOMB DROPPING

In addition to their functions of reconnaissance, the observation of the fire of artillery, and the combat of hostile machines, both heavier and lighter than air, much time, thought, and ingenuity have been given to the subject of dropping projectiles. Bombs of various sorts weighing from a couple of pounds to 50 pounds have been tried. The most common ones weigh from 15 to 35 pounds. At the height at which aeroplanes are required to fly it is extremely difficult to hit an object with any certainty. Various devices have been used and tried for this purpose. The factors of height, speed, and wind, are almost impossible to compensate for entirely, up to the present time, so that consequently bomb-dropping in general or the launching of projectiles of all kinds from aeroplanes has not attained great results insofar as the actual destruction of material or personnel is concerned. Advances along this line are constantly being made, however, but progress is slow. A special type of aeroplane has been developed for dropping bombs and battle purposes. For bomb attacks on any locality these machines are sent in flotillas of from 30 to 60 machines, each of which is provided with from 5 to 10 bombs. They go to the locality and circle over it, dropping their projectiles. Against railways, roads, bridges, and hostile parks of various kinds, this method of attack has given considerable success.

IV. ORGANIZATION OF AEROPLANE UNITS

17. TACTICS OF AEROPLANES

As to tactical use aeroplanes seem to be approaching methods similar to those used by a navy. That is, first the speed machines reconnoitre to the front; they are followed by the battle machines, which in their turn clear the way for the reconnaissance aeroplanes; those assigned to the artillery stay right with their guns. Fortresses, harbor-defense works, and naval formations require special organizations of aeroplanes, some or all of which may be operated from the water. The organization, kind, and number of the machines and personnel required for this particular service depend on the special locality and mission of whatever formation the aircraft are to be attached to.

18. DEVELOPMENT DURING EUROPEAN WAR

The use of aeroplanes is gradually being developed from experience in the European War. Organization has been found to be one of the most important considerations; in general the organization has been into squadrons. The squadron is a tactical and administrative unit. It has a personnel consisting of pilots, observers, bomb droppers, mechanicians, chauffeurs, and drivers. Flying personnel has to be developed in the military service. Unlike chauffeurs, for instance, there are few in the civil population who can be drawn on. The few who fly are demonstrators, exhibition flyers, or sportsmen. They are very few in number and scarcely a military asset. In France the squadrons usually have six machines and two spares. They have the same organization of depots of resupply that other units of the armies possess. The squadrons usually consist of complete units of one kind of machine; that is, speed, reconnaissance, or fighting. These squadrons are usually assigned to an army, or more if the machines and personnel are available.

(*Continued on page* 529)

PERFORMANCES REQUIRED FROM VARIOUS MILITARY TYPES

	Light scout.	Reconnaissance aeroplane (*a*)	Reconnaissance aeroplane (*b*)	Fighting aeroplane (*a*)	Fighting aeroplane (*b*)
Tankage to give an endurance of	300 miles	300 miles	200 miles	200 miles	300 miles.
To carry	Pilot only	Pilot and observer plus 80 pounds for wireless equipment.	Pilot and observer plus 80 pounds for wireless equipment.	Pilot and gunner plus 300 pounds for gun and amunmition.	Pilot and gunner plus 100 pounds.
Range of speed	50 to 85 miles per hour	45 to 75 miles per hour.	35 to 60 miles per hour.		45 to 75 miles per hour.
To climb 3500 feet in	5 minutes	7 minutes	10 minutes	45 to 65 miles per hour.	8 minutes.
Miscellaneous qualities.	Capable of being started by the pilot single-handed.		To land over a 30-foot vertical obstacle and pull up within a distance of 100 yards from that obstacle, the wind not being more than 15 miles per hour. A very good view essential.	10 minutes A clear field of fire in every direction up to 30° from the line of flight.	A clear field of fire in every direction up to 30° from the line of flight.

Instructional aeroplanes with an endurance of 1·50 miles will also be tested under special conditions; safety and ease of handling will be of first importance in this type.

THE AEROMARINE "TWELVE"

The Aeromarine Plane and Motor Co., of Nutley, New Jersey, have carried through a series of exhaustive dynamometer tests of their twelve cylinder aeronautical engine during the past few days, and in an early issue we hope to present to our readers the result of these tests. Meanwhile we have pleasure in publishing the specifications.

The description supplied by the manufacturers is as follows:

SPECIFICATIONS

SIZE AND TYPE.—4 5/16" bore x 5 1/8" stroke. "V" type. Cylinders are cast separately from a special grade of Vanadium iron, having cylinder head with valve seats integral. The cylinder jackets are not incorporated in the casting, but are electrically deposited after all the machinery operations are performed. This allows of the casting being cleaned both inside and outside of cylinder bore, and insures a uniform water space with minimum weight. The cylinders are rough machined, then set out for aging, and after finished machining are ground to a mirror finish.

CRANKSHAFT.—The crankshaft is of the 7-bearing type and is made from solid billet of the highest grade chrome nickel steel. The main bearings are of 2¼" diameter x 1 11/16" long, with the exception of the rear and front bearing, which are both 3/16" long. The shaft is counterweighted to reduce vibration to a minimum. The connecting-rod bearings are 2/18" diameter x 2¾" long, all bearings being ground to within .0005". The crankshaft is hollow, the oil being forced from a tube cast in the crankcase to the main bearings and through the hollow shaft to the connecting rods. Two thrust bearings are installed on the propeller end of shaft, so that motor can be used for either tractor or pusher type.

CAMSHAFT.—The camshaft is integral. It is forged out of a high-grade nickel steel and is located directly above crankshaft. The surfaces of the cams and bearing are hardened and ground, the bearing being of large diameter, so that the camshaft can be removed without disturbing more than one end bearing. The cams have a lift of 5/16" and ½" wide, and are arranged close to the bearings, thus giving a minimum bending on the shaft. Body of the shaft is 1 1/16" diameter, a ½" hole being drilled into the entire length of the shaft for lightness. The cam bearings are lubricated by oil forced from a tube cast in the crankcase and located directly over cam bearings. Cam surfaces and bearings are hardened to a scleroscopic hardness of 85 to 90. The shaft has 7 bearings, the dimensions being 2" diameter x 1 1/8" long, with the exception of the rear bearing, which is 1 1/16" diameter x 2½" long, and a front bearing which is 1/16" x 2¾" long. Timing gear is keyed on the front housing. A slot is provided at the front end of camshaft so that it is possible to couple up a Warner Tachometer or other approved type, if it is desired. Arrangement is made for coupling a Hopkins Electric Tachometer driven by gear bolter to camshaft gear, the front cover having a support arranged to take this tachometer.

CONNECTING RODS.—The connecting rods are of the fork type, thus enabling the crankshaft to be short at the crank-pin bearings and reducing the bending movement on the shaft to a minimum. These rods are forged from high-grade chrome nickel steel, the section from the fork to the main bearing being channel section and that of the main body of the rod being I-beam section. These rods are milled out to absolute balance, and all bolt holes are jig drilled to accurate relationship to the bore on the large end. Special fixtures are used for insuring accuracy in drilling the wrist-pin hold and in machining this end, so that it is evenly distributed from the center line of the I-beam section. The forked rod is known as the outside rod, and the plain rod is called the inside rod.

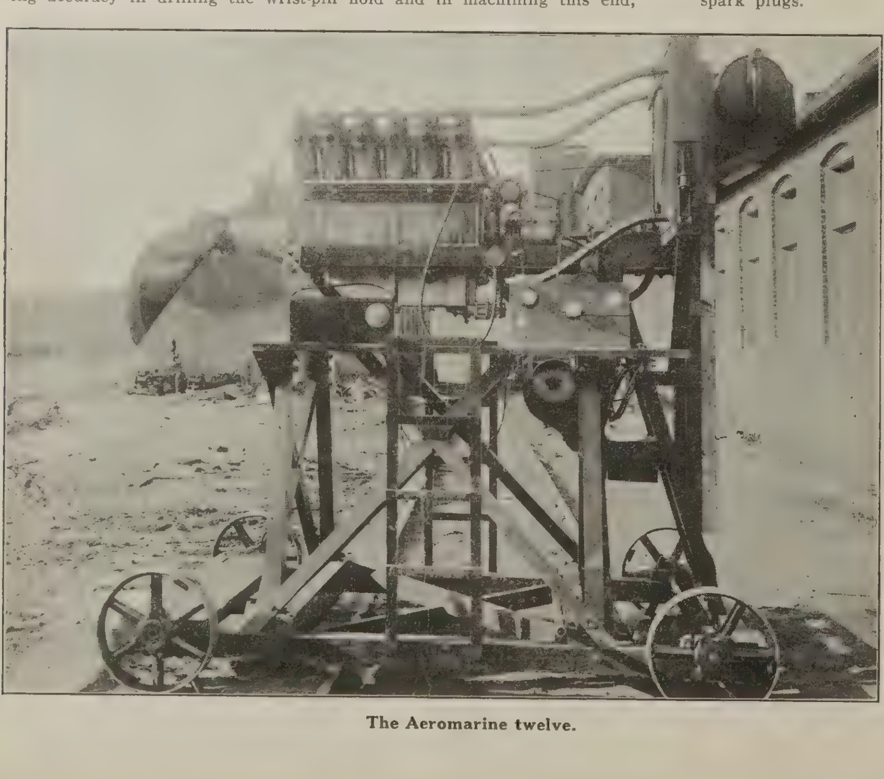
PISTON ASSEMBLY.—Pistons are cast from high-grade semi-steel. These pistons are 4 3/16" long, and are fitted with four rings, two rings being arranged in a single groove. A ⅞" diameter chrome nickel wrist-pin is provided, this pin being held fixed in the connecting rod and having a bearing on the piston bosses. This gives an ideal bearing and lubrication is insured from the cylinder walls by means of groove which leads the oil through the hollow wrist-pin. Pistons are first rough machined, then set out for aging, and afterward machined almost to size, then heat treated and ground to a mirror finish. All pistons are lapped into the cylinders at final assembly.

VALVES.—The valves are of the concentric type, the inlet valve working inside the exhaust and both valves being seated directly in the center of the cylinder head, thus insuring an ideal form of combustion chamber, with minimum carbon deposit. Both valves are made of 3½% nickel steel, properly machined and ground, and the exhaust valve is fitted with a regular piston ring, to guard against any leakage of the gases. Large diameter, oil-tempered springs, supported in nickel steel cups, and readily accessible on the top of the cylinder, insures the proper fitting of the valves, the clearance on which can be easily adjusted by means of the adjustable rod actuating rock-arm.

CRANKCASE.—Crankcase is cast of an aluminum alloy of 92% aluminum and 8% copper, and is sandblasted to thoroughly clean out the entire interior of the casting. These crankcases are given a rough machining operation over the entire surface, and the main bores, the finishing operations coming on after the greater part of metal has been removed in machining, so that when finished there will be no distortion of the surface due to the removal of too much metal. The entire case is designed with a view of forming a rigid support for the cylinders and to take up all stresses transmitted without allowing distortion or misalignment of any moving parts. This is accomplished by bringing the walls of the crankcase well under the center line of the crankshaft and tying ends by solid ribs across the bottom of the case. The propeller end housing is piloted on to the main casting by a groove pilot of large diameter, and the front cover is located by large dowels to insure perfect alignment.

OIL SUMP AND OILING SYSTEM.—The oil sump forms a bottom cover for the crankcase and is cast of the same metal. This is bolted rigidly to the main case on all sides and is arranged at the lower front end to carry the oil pump. A narrow channel, bolted separately, divides the oil sump in the center and through this channel the oil from the cylinders and bearings is drawn through a geared pump and delivered into the main sump. This prevents the oil which is in the main sump from flooding into the cylinders if the machine is flying at an angle, and is found absolutely necessary in loop-the-loop, etc. The oil is grained through a large gauze before it enters the center channel and is again strained before being pumped from the main sump through the smaller oil pump to the bearings. A relief valve is arranged so that the oil pressure can be regulated, a by-pass being arranged so that the surplus oil is returned to the main oil sump.

IGNITION.—Ignition is supplied by two 12-cylinder Dixie magnetos. These magnetos are of the waterproof type, and are connected by an adjustable coupling direct to a shaft which is driven one and one-half times crankshaft speed and geared directly to crankshaft gear. With this system it is possible to run the motor even should one of the magnetos get out of action. The gears driving the magnetos are mounted on a shaft carried by two ball bearings. Suitable conduit is provided to protect the wires and to give proper distribution to the spark plugs.



The Aeromarine twelve.

COOLING SYSTEM.—The motor is water-cooled, the water being forced through duplex centrifugal pump, the pump being designed in two sections, each section supplying its own block of cylinders. This insures even distribution, and the pump is designed so that the water, being on both sides of a closed impeller, will balance the propeller and set up a minimum wear on the friction surfaces. The water is forced through the copper-deposited cylinder jackets, through a thermostat which regulates the temperature and insures the motor at all times working under proper thermal conditions. Cylinder heads are cored out so that the water circulates around the gas passages, by this means heating the mixture before it is drawn into the cylinder.

CARBURETION.—Two Zenith carburetors are used.

AIR PUMP.—Power-driven air pump is designed into the motor to maintain a pressure in the gasoline tank. This allows the tank to be located in any position relative to the motor.

ACCESSORIES. — Complete propeller hub and flange, with bolts and nuts; also tool kit, comprising special wrenches, are supplied with each motor.

WEIGHT.—The weight of the motor, complete as specified above, will be approximately 750 lbs.

SPINNING

By George H. Bettinson, in the *London Aeroplane.*

Most pilots, more especially pupils, are sure to experience some time during their career a "spin." These few notes, therefore, are written in the hopes that they will save some accidents caused by careless and inexperienced pilots, who are in nine cases out of ten directly responsible for their machines "spinning."

Spinning arises from "side-slipping." Side-slipping is of two kinds: (1) Outwards side-slip and (2) inwards side-slip.

When a spin occurs a pilot must immediately ascertain which of these his side-slip is, and also whether his air speed is normal or abnormally low. The former is almost always known when it is possible for the flier to be aware that he is turning (i.e., when he is not in a fog or a cloud). The air speed can only be known with any assurance from the air speed indicator.

In general, when a machine gets out of control, the first thing to do is to throttle the engine right down immediately. Then, if there is fair height, the machine should be dived. If there is not room to do this there will probably be a smash in any case, and it is accordingly better that the engine be switched right off so that all danger of fire is avoided.

The problem of spinning is best considered on the stable and unstable aeroplane separately.

1. If the aeroplane is a stable one and the speed correct, side-slips in nine cases out of ten correct themselves. Suppose the side-slip is caused by the pilot doing too wide a turn with an excessively heavy bank, the aeroplane will, under gravity, side-slip towards the ground, and the resultant side-wind directed upwards from the earth will tend rapidly to realign the planes, thus curing the side-slip, if there is space enough.

2. On the other hand, if the speed is correct but the aeroplane unstable, the only way a spin can occur is by the fin surface aft being inadequate or else wrongly disposed. The flier's best course of action is to throttle down his engine and dive the machine for speed recovery, at the same time firmly holding his rudder appropriately—the straight position is generally best.

We have now considered the causes of slipping on stable and unstable aeroplanes given that the air-speed in each case is correct (i. e., normal or slightly abnormal). We will now consider the cases of the unstable and stable aeroplanes with the speed too slow.

3. Several conditions may occur in various unstable aeroplanes.

(a) The fin surface alone or the fin surface plus rudder surface may be inadequate.

(b) The rudder reaction may be too strong for the pilot to master it.

(c) The total fin surface aft (i. e., fin plus rudder) may be excessive.

(d) The operation of the wing controls at extreme slow speeds may produce spinning tendencies.

(e) The fin surface may be unsymmetrical below and above the body of the aeroplane.

In (a) and (b) the pilot should hold the rudder firmly straight and dive for speed recovery, or the rudder may be slightly turned in opposition to the direction of the spin.

(c) This case is most unusual. The effect of too large a fin area aft would probably only be got by adding to the fin area the area of the rudder, which is supposed to be held rigid. The remedy is to let go the rudder for a moment and dive the machine whilst she re-aligns and becomes controllable again.

In (d) the only occasion when a spin can arise is when an underbanked turn is made presumably because the machine is very near the ground. The mere fact that there is a spin tends to raise the outer wing, which is revolving at a greater speed.

Let us suppose now that the pilot for some reason or other is trying to avoid the bank. He accordingly pulls the inner wing flap down in order to increase the lift of this wing, but much to his surprise, unless he is an experienced pilot, his action (contrary to the effect at normal flying speeds) diminishes the lift of this wing, thereby increasing the bank. This action certainly gives the aeroplane its proper bank, but at the same time it also causes a more rapid spin around the inner wing tip and there will be a smash unless there is sufficient ground clearance.

The general instruction in (d), therefore, to the flier whose air-speed is abnormally low is to turn the outer flap down, which will retard the spin. We learn by this that lateral control effects are reversed at stalling speeds.

To continue, the moment the aeroplane is straightened out by this inverted action, the pilot should open the engine "full out" in the hopes that the machine will attain sufficient speed to avert a serious "pancake."

The moral, therefore, of the latter case is never to attempt a turn with the speed of your machine near stalling point. Unfortunately, this particular form of error is one in which there are special excuses for falling into.

For example: If the aeroplane is over ground which cannot be alighted upon, and the engine suddenly "peters out," the flier will want to do two things.

(1) Turn the machine back towards good landing ground just quitted, and

(2) Maintain as much height as possible.

The writer himself has experienced this when flying a machine "somewhere" over the East Coast. In trying to avoid some telegraph wires on the cliffs, the act of turning caused considerable loss of speed and consequent loss of height, and the machine, which, by the by, was a stable one (a B.E.2c.), got into a spin, ending in a nose dive into the compromising place he was trying to avoid—the sea.

Case (e) generally applies to small scouting aeroplanes having large engines in relation to their size. When flying at low speeds the swirl of the slip-stream affects the unsymmetrical fin surface, creating a bank at stalling speed.

(4) Stable aeroplanes with speed too slow: First, considering outward side-slips under each of the different heads given in paragraph 3.

(a) Is non-existent.

(b) The rudder must be held firmly straight.

(c) Is non-existent.

(d) The remedy is the same as when the speed is normal.

(e) Ditto.

Inwards side-slips generally only occur with stunt flying, except in the case of flying in a cloud or in a fog, when the machine may unwittingly be held on a bank with the rudder in straight position, giving the same results as an inward side-slip due to an over-banked turn. The remedy is to cut out the engine and hold the rudder over in the direction of the side-slip, then dive.

As soon as the machine is moving almost vertically downwards the rudder must be kicked straight and the elevator pulled gently backwards. (N.B.—this procedure has been confirmed experimentally in the air.)

It does not appear worth while to discuss cases (a) to (f) separately. The main point that the pilot must remember is never to fly his machine at an air speed which is practically stalling point, and this rule is very easily observed if the pilot will watch his indicator board closely.

Stalling and flying too slowly: Some pilots have a natural tendency to judge the speed of their machines by their ground speed, and seem to forget entirely that "ground sped" is an entirely different speed from "air speed."

A pilot should always be very careful when turning a machine from flying against the wind into flying with the wind. Having turned a machine down wind, she may appear to be flying quite fast, but in reality the air speed may be almost on stalling point.

Thus, for example, if the pilot is flying a 40 m.p.h. aeroplane (40 m.p.h. being the lowest speed at which she will not stall) against a 20-mile wind, an air speed of 40 m.p.h. is quite safe (20 m.p.h. being the ground speed). Now, when the pilot turns the machine down wind, he is only just safe at a ground speed of 60 miles an hour, and in reality, although the machine in relation to the ground beneath him is traveling at an enormous speed, he is only just inside the limit of stalling speed

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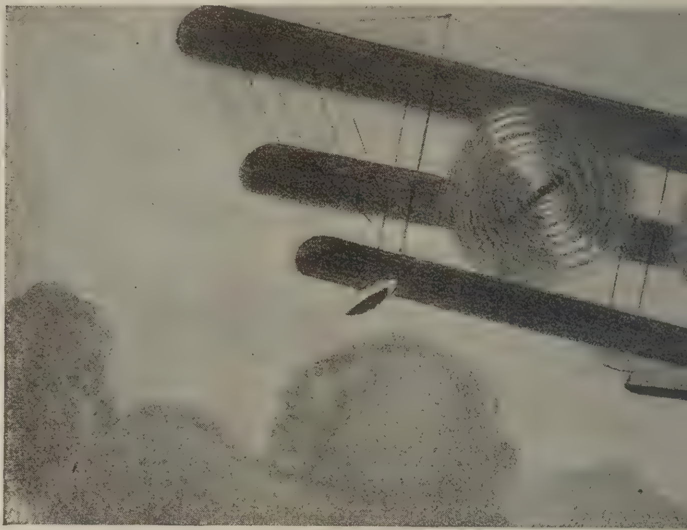
- Weather Bureau Exhibit.
- Bureau of Standards Exhibit.
- Pan-American Union Exhibit of Relief Maps, etc.
- Coast Guard Exhibit.
- Post Office Exhibit of Maps and Locations of 200 Proposed Aerial Mail Routes.
- Smithsonian Institute Exhibit.
- Dirigible Balloons.
- Balloons.
- Motion Picture Hall.
- Assembly Hall.
- Press Room.

The aeroplane will knit the states of the Western Hemisphere into an integrally united, co-operating and friendly combination, allied for well-being in sport, trade and commerce, as well as for strength in time of possible war.—Alberto Santos-Dumont, Honorary President, Pan-American Aeronautic Federation.

Whatever builds up the American Aeronautic Industry builds up the source of supply for national defense—and takes us nearer to the age of aerial transportation, which promises to be a most wonderful age.—Alan R. Hawley, President Aero Club of America.



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SOME PROBLEMS IN AEROPLANE CONSTRUCTION

By Capt. V. E. Clark, Chief Aeronautic Engineer, U. S. Army; Capt. T. F. Dodd, Signal Corps, U. S. Army; and D. E. Strahlmann, Engineer, War Department, Office of the Chief Signal Officer

[The following paper was prepared by the authors for presentation at the annual meeting of the Society of Automobile Engineers, held on January 11th, in New York, and covers important problems in the construction of aeroplanes for military use in this country. It is reprinted herewith through the courtesy of the S. A. E. Bulletin.—Editor.]

(*Continued from page* 507)

PROPELLER STRESSES

In connection with the subject of propellers, it may be of interest to give a brief review of the variation of stress that occurs in a propeller blade under an assumed condition of flight.

The blades of a propeller are subject to the following stresses when an aeroplane is in any but a straight-line flight:

1. *Shear* due to aerodynamical forces.
2. *Torsion* due to the distance between the center of gravity of the blade section and the point of application of the resultant of the air reactions.
3. *Tension* due to centrifugal force.
4. *Steady bending* due to aerodynamic forces; torque and thrust imposing a distributed load on the blade, the hub being the fixed point of support.
5. *Reverse bending* due to gyroscopic forces, which occurs only when the aeroplane has rotation about an axis, as in making a turn or pulling out of a dive. As a matter of fact, an aeroplane is continually turning to some extent if the flight be in disturbed air.

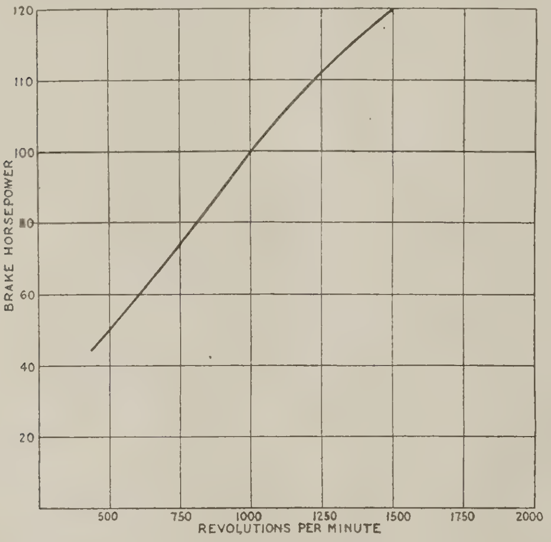


FIG. 11—ASSUMED BRAKE HORSEPOWER OF ENGINE DRIVING VARIABLE-PITCH PROPELLER

Each of these forces produces a maximum stress of tension and compression in different parts of the blade, hence the resultant fiber stress at any point will be equal to the algebraic sum of the individual stresses at that point.

It is sufficient to calculate the stress at the points *a, b, c,* (Fig. 12) along the blade, as these points will be those of maximum stress.

The shear in any case is small and can be neglected in design. The torsion is also small. In good designs, when the thrust is great, the point of application of the air reactions is but little removed from the axis passing through the center of gravity of the section.

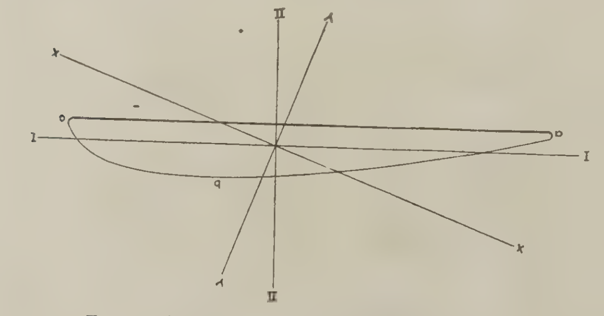


FIG. 12—POINTS OF MAXIMUM PROPELLER STRESS

The curves of stress given are for a three-blade propeller of about 8½ ft. diameter, 5 ft. pitch, absorbing 150 h.p. at 1300 r.p.m. The curves are not accurate, as they are intended merely to give a general idea of the order of magnitude of the stresses likely to occur in such a propeller.

The stress caused by centrifugal force is uniform over any section of the blade and varies in intensity at points along the blade, as shown approximately in Figs. 13, 14 and 15.

Steady bending due to aerodynamic forces is caused by torque and thrust. These forces act along *X—X* and *Y—Y,* respectively for any section, such as shown in Fig. 12. When resolved along *I—I* and *II—II* they induce bending moments that cause the fiber stress as shown in Figs. 13, 14 and 15.

Gyroscopic moments are only induced when the aeroplane is changing its direction of flight. In order to estimate the stress set up in the blades an assumption must be made as to the angular velocity of the propeller axis; that is, as to the precession. There is some question as to the assumption it is reasonable to make in computing the stresses. The type of aeroplane, size and disposition of the larger masses, such as engines, etc., will affect the rate at which a machine can be turned in flight. In general, the angular velocity in yaw will not greatly exceed 0.35 radians per second. It must be remembered, however, that a steeply-banked turn also involves rotation in pitch.

The maximum angular velocity attained in coming out of a steep dive can be estimated from the characteristics of the aeroplane and the factor of safety, which determine the maximum high speed attainable and the radius of curvature of the path along which it is possible to pull the machine out of its dive safely. A safe value for the angular velocity in pitch for the usual type of present-day aeroplanes is about one radian per second. Loops have been turned in about 6 seconds, which gives about the value mentioned of the angular velocity.

A precessian of one radian per second at the normal speed of the engine should therefore be assumed in computing the stresses.

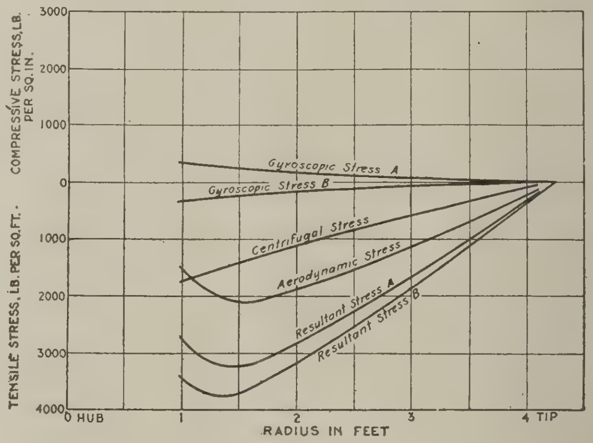


FIG. 13—FIBER STRESS IN PROPELLER BLADE AT POINT *a* (SEE FIG. 12)

The stresses set up by gyroscopic forces are alternating, changing in sign (tension to compression) twice in each revolution of the propeller about its axis.

The fiber stress caused by the gyroscopic moments is given in Figs. 13, 14 and 15. Algebraically adding the fiber stress at the three points chosen gives the approximate value of the resultant fiber stress at those points, as shown in the same figures.

It will be noticed that the maximum stresses occur at some distance out from the hub. To insure a good wearing blade, which will stand up under the necessarily hard usage given it in the field, a factor of safety of not less than 5 is suggested as being the minimum consistent with requirements when the three principal stresses are taken into consideration.

SUGGESTIONS FOR IMPROVEMENTS IN DESIGN

These suggestions on powerplants are based on the experience of the First Aero Squadron, U. S. Army, in the field.

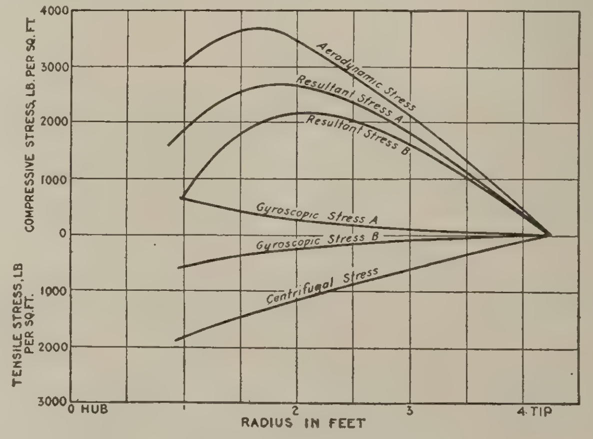


FIG. 14—STRESS IN PROPELLER BLADE AT POINT *b* (SEE FIG. 12)

It is considered extremely poor practice to use shims under the caps of crankpin and crankshaft bearings.

Many American crankcases are not sufficiently rigid in construction. It is believed that crankcase castings are not designed and built, in this country, with sufficient care. Some of the jigs for boring crankshaft and camshaft bearing seats are not so accurate as desirable.

In some cases it has been found that pistons are not of uniform weight, and are not carefully made.

Lack of interchangeability of parts and *careless workmanship* have been great faults in this country.

Oiling System

This should be by pressure to all important bearings, preferably from a gear pump. Screens should be provided to protect the suction pumps. For engines that have push-rod and rocker-arm valve mechanism, means should be provided to reduce the friction on the exhaust-valve rocker-arm bearing, especially if the valves are more than 1¼ in. diameter.

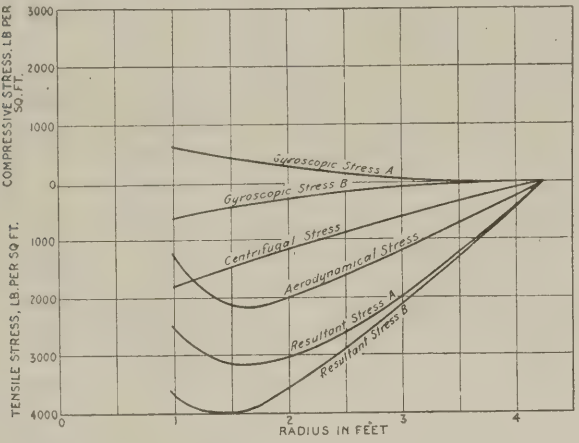


Fig. 15—Stress in Propeller Blade at Point *c* (See Fig. 12)

Ignition

All military aeroplanes, except possibly the pursuit type, should have two complete and independent ignition systems.

Engines larger than 140 h.p. should have a booster system for starting on battery spark, if a starter is not provided.

It is believed that our magnetos would have much longer life if a more suitable shock-absorbing device between the driving gear and the magneto shaft were provided. A magneto mounting should be machined so that the magneto shaft will be exactly in line with its driving shaft; dowel pins and dowel-pin holes to preserve this alignment should be provided. No shims should be used here. We have had considerable trouble because of non-uniform and warped carbon brushes.

Fuel Supply

Carbureters should be located in such a way that oil, water and impurities cannot enter them. They should be supported from the engine and not from the frame work of the aeroplane. They should be supported independently of the intake manifolds, if practicable.

Gaskets for connections in intake manifolds should be as thin as practicable. Manifolds built of copper, brazed, or of steel, welded, are considered preferable to cast manifolds. Steel is considered preferable, but should, of course, be heat treated after welding.

It is urged that more study and care should be put into the design relating to shape and finish of the interior of intake manifolds and passages. It is believed, in this connection, that much greater efficiency can be obtained by attention to fluid flow.

Cooling System

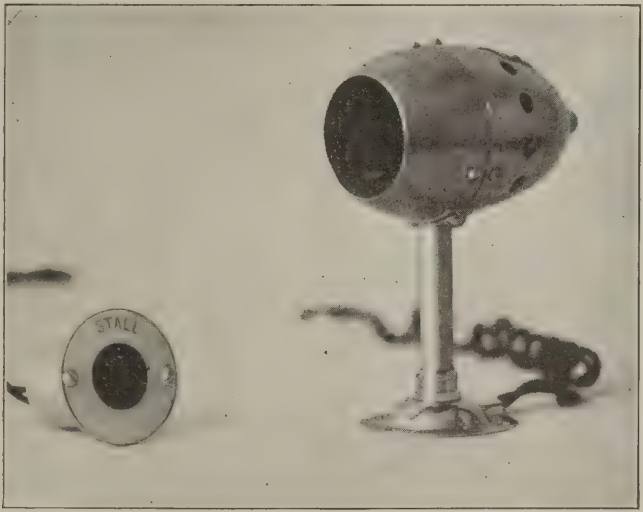
Radiators should preferably be placed at the leading edge of the upper wing, the header being shaped so as to form part of this leading edge. If it is necessary to place the radiator between the engine and the propeller, the radiator should be circular. The radiator should be provided with a sufficient number of points of support to prevent deformation of the shell owing to shocks on landing.

Care should be taken with the alignment of tubes at the connections in the water-circulating system. A ring reinforcement might be welded to a flanged end of the thin tubing and the face machined so as to make a good fit to the cylinder jacket. It is considered bad practice to expand thin tubing.

Warns the Aviator Against Stalling

The stallmometer is an instrument that warns the aviator when his machine is approaching a stalling condition by indicating that the minimum air speed has been reached. It is mounted in any convenient position where the air flow is unobstructed.

The Sperry stallemometer is adjustaable for any desired air speed, depending on the aeroplane on which it is installed. When the pre-determined speed is reached an electric contact is made in the stallemometer, closing the circuit to an indicating lamp which is mountd on the instrument board.



The Sperry Stallometer.

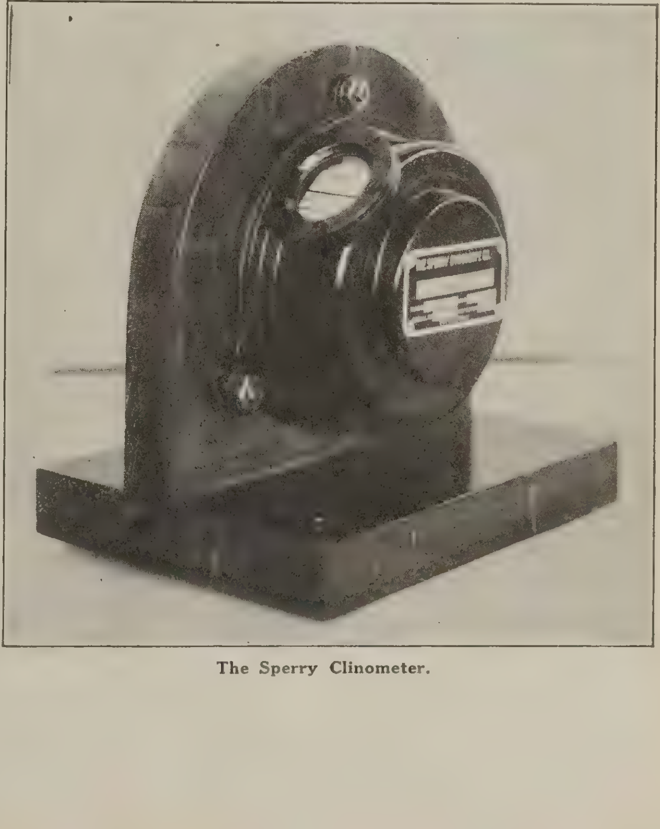
Signals Aviator to Keep the Aeroplane Level

Aviators wishing to know at any time the correct fore-and-aft position of the machine, with reference to the horizontal, can read it on the scale of the Sperry dead-beat clinometer, which is exhibited at the Sperry booth.

The operation of this instrument is simple. Whenever the clinometer is tipped forward or backward by the motion of the aeroplane this movement is registered on a scale mounted on a wheel which is damped by floating in a liquid.

If the aeroplane tips forward, the scale moves upward indicating in degrees below the zero line the exact angle. If the machine tips backward, the scale moves downward, the exact amount which is likewise shown in degrees. The scale is painted in radium, so that it is visible at night by its own light.

The case, measuring four and three-eighths inches in overall diameter, is made of a bronze spinning and painted black. The clinometer is usually mounted on the instrument board in the pilot's cockpit. But it may be placed elsewhere in the fuselage, providing that location is such that the instrument can be seen at all times. Though comparatively new, the Sperry clinometer has already rendered valuable and efficient service in its particular field.



The Sperry Clinometer.

FOREIGN NEWS

ARGENTINA.

Captain Alarcon, a Bolivian aviator, was killed while making a flight at Buenos Aires, Argentina, on January 23d.

AUSTRIA.

An Austro-Hungarian airman on January 22d compelled a Russian aeroplane to land near Marmoros-Sziget. The aeroplane, which was undamaged, and its occupants, were taken in custody.

FRANCE.

On the morning of January 22, German aeroplanes dropped five bombs on Montdidier. A Fokker landed in French lines near Fismes. Two other German aeroplanes were brought down in an aerial engagement in the neighborhood of Marchelepot; another by the fire of special guns in the direction of Amy (Oise), and another German aeroplane was brought down in the neighborhood of Vauxoere (Aisne).

In the afternoon a French pilot brought down a German aeroplane, which fell in the French lines near Navarin farm. In the region of Montmedy another German machine, subjected to machine gun fire at close range by a French aeroplane, was crushed as it fell to the ground within the enemy lines near Amel.

Two enemy machines were brought to earth, one near Samogneux and the other in Spincourt Forest by French pilots on the 23d.

The railroad at Dun-sur-Meuse was damaged by shells dropped from a French aeroplane on the night of January 23d.

On Thursday, January 25th, two French aeroplanes bombarded the railroad station and military factories at Ham, causing fire and heavy explosions.

On January 26th a German aeroplane was brought down to the west of Barleux by French anti-aircraft guns.

The text of the War Office announcement on aerial activities is as follows:

"On the Somme front January 25th Lieutenant George Guynemer brought down within our lines at a point near Lignières his twenty-eighth German aeroplane.

"It has been confirmed that Lieutenant Herteaux during January 24th brought down two enemy machines. The second fell at a point fifteen hundred yards to the south of Rocquigny. Lieutenant Herteaux furthermore brought down a German aeroplane on January 25th, and this brings to nineteen the number of enemy machines destroyed up to the present time by this pilot.

"A third and a fourth enemy aeroplane, after engagements in the air with French pilots, have been brought to earth. One was wrecked within our lines to the north of Altkirch and the other to the south of St. Etienne-à-Arnes, in the Ardennes. Furthermore, it has been confirmed that the German aeroplane which on January 23d was subjected to machine gun fire at close range by one of our machines was destroyed at a point to the north of Craonne.

"During the day of January 24th and also during the night of January 25th French bombing squadrons conducted the following aerial operations: Two hundred and ten kilograms (462 pounds) of projectiles were thrown down upon the railroad station at Brieulles, where an extensive fire was observed; numerous projectiles were thrown down also upon the railroad stations at St. Quentin and Voyennes, the barracks of Liancourt-Fosse, the railroad station and barracks at Guiscard, the railroad station at Tergnier and on certain buildings to the south of Chauny."

At Verdun, on January 27th, five German aeroplanes were brought down.

Admiration has been aroused by the exploits of Lieut. George Guynemer, who has brought down five German aeroplanes in three days. His total bag of hostile machines is now thirty. He has been mentioned in the communiqué for four successive days.

The War Office statement of January 27th announces that Lieut. Guynemer forced his thirtieth prize to land within the French lines near Doullens, and the aviators were captured. On Thursday, January 25th, he brought down two machines, one near Ligniers and one near Goyencourt. On Wednesday he brought down two, one near Chaulnes and one near Maurepas, both on the Somme front. Maurepas is behind the British lines.

The deeds of Guynemer and Herteaux contributed in large measure to the allied victories in the air announced in the reports this week in which many more German than allied machines have been lost. The communiqué reports that during Friday five German aeroplanes were brought down all told.

Powerful electric sirens installed in all quarters of the city of Paris hereafter will warn of the approach of Zeppelins. This decision was taken because only those families living on street fronts through which fire engines ran trumpeting heard the alarm for Zeppelins, which previously has been given thus by the Fire Department.

GERMANY.

Official figures for 1916, announced here by way of Sayville wireless, claim German aviators victors in a majority of the aerial battles on all fronts, and that Germany lost fewer battleplanes than her antagonists.

The official figures report the total losses of aeroplanes on both sides during 1916 to have been 1,005. Of these the Entente forces lost 784, the Germans 221. On the west front alone both sides lost 920, and of these just 180 were German warplanes.

The number of British and French aeroplanes shot down on January 23d was increased to ten by official reports.

The ninth machine was brought down after an air combat in the village of Bretonneaux. The tenth was forced to land near Chauny.

Half a dozen aviators are climbing toward Boelke's mark of forty-two machines destroyed.

Germany has four candidates for Boelke's laurels. Lieutenant von Buelow winged two in the day, both dropping within the German lines; Lieutenant Frankl mastered his fifteenth foe near Fort Douaumont; Lieutenant von Richthofen brought his mark up to seventeen, and Lieutenant Baldamus scored his tenth.

The Germans also claim to have advanced far behind the Allied lines on reconnoitering tours. A German battle squadron, accompanied by observation flyers, hurled two tons of bombs on the Pompey and Frouard foundries, north of Nancy, according to Berlin, while the observers co-operated with German heavy artillery in bombarding these plants.

GREAT BRITAIN.

On January 21st British aeroplanes dropped six bombs of 100 pounds each in and around the Turkish munitions factory in the Bagdad citadel.

According to recent reports, the British troops are continually in contact with the Turkish forces at Kut-el-Amara. The air raid referred to therefore probably involved a flight of about 100 miles, the distance between Kut and Bagdad.

British aeroplanes were active on January 22d in co-operating with artillery. One of the British machines is missing. On the 21st an enemy machine was forced to descend in the neighborhood of Aubigny; the pilot and observer were made prisoners.

A squadron of sixteen British naval aeroplanes made a successful attack on the blast furnaces of Burbach, in the valley of the Saare, on Monday, January 22d, scoring a number of hits.

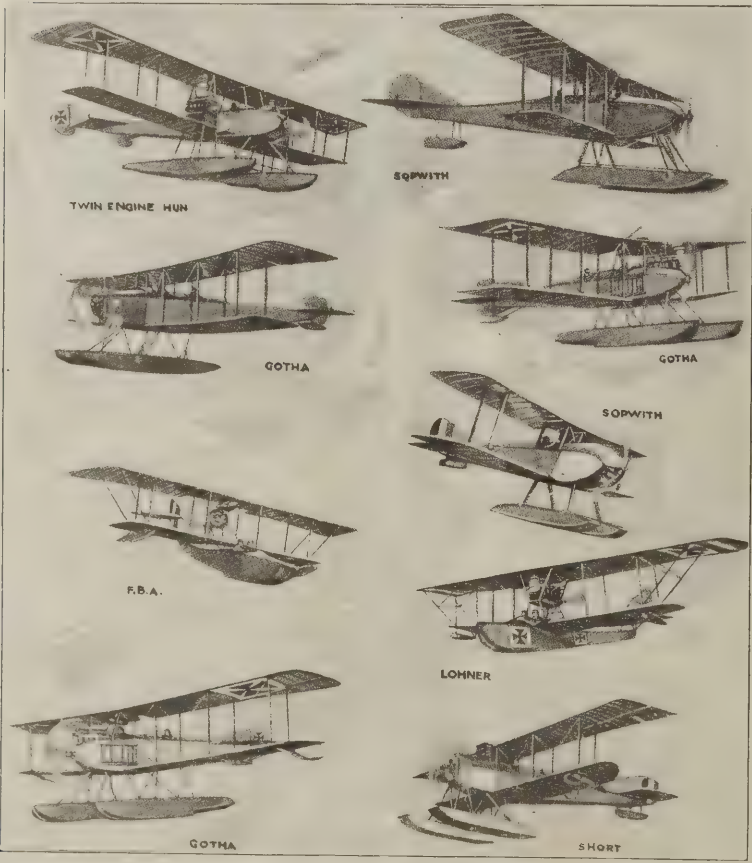
British airmen bombarded the enemy's positions north of the Somme during January 26th with good results. Elsewhere the artillery activity was normal.

On the 25th, the British aeroplanes successfully bombarded a number of places behind the enemy's lines. There were many air fights, in the course of which five German machines were destroyed and five others driven down damaged. One of the British aeroplanes is missing.

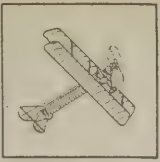
RUSSIA.

On the 22d, in the neighborhood of the Russian position South of Brzezany, Lieutenant Grassa, an aviator in the French service, attacked a German aeroplane which fell into the German's position near the village of Komorokhion, on the River Narayuvka.

In the afternoon of January 25th a German aeroplane was hit by the Russian artillery, descending into their lines in the region of the village of Smolno, west of Brody (northeast of Lemberg). During its descent the machine caught fire from flaming benzine. The pilot and the observer, who attempted to escape, were made prisoners and two machine guns in the aeroplane were captured.

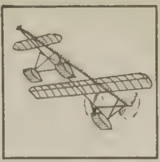


Recent types of seaplanes and flying boats which are prominent on the various European battle fronts. Courtesy London *Aeroplane.*



MODEL NEWS

Edited by G. A. Cavanagh



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Aero Science Club Notes

A very interesting meeting of the Aero Science Club was held on Saturday evening, January 20th, at the club rooms of the organization. Among the speakers present was Mr. Frederick C. Hild, aviator, now connected with the Eastern Aeroplane Co. Mr. Hild gave a very interesting discourse, on the manufacture of aeroplanes in the present day which was appreciated by all present.

On Saturday evening, March 24th, this organization will hold a reception and dance at Terrace Garden, New York City. A committee has been appointed to take charge of this matter, the committee consisting of Messrs. Schultz, Gladki, Meyers, Barker, Bauer and King. All arrangements have been made and it is expected that a very enjoyable evening will be assured. All persons interested kindly address the Reception Committee, Aero Science Club of America, 29 West 39th Street, New York City.

Propellers

In speaking of propellers, states Mr. E. W. Twining, there are two very different ways in which model propellers may be made. The one, a somewhat laborious process of carving the blades and hub complete from a block of wood either solid or built up of layers or laminations, glued together; and the other, of steaming to the required shape a simple flat piece of thin wood previously cut to a certain outline.

There are many beautifully carved and polished model propellers on the market, but unfortunately these are not fit for rubber-driven models, except perhaps those made by the Model Aeroplane Companies. The French propellers are, as a rule, much too short in pitch and are only suitable for scale exhibition machines or for models fitted with power motors other than rubber.

The first of the accompanying drawings, Fig. 54, shows the method of carving, and in addition represents a very efficient long-pitched, wide-bladed screw suitable for long flights with rubber motors.

At *A* and *b* are shown two views of a wood block on which are drawn cross lines *C* giving the outline, in plan, of the blades; the shaded space *d* is then cut away to these lines. The line C^2 is then drawn on both the ends of the block and continued around the sides. On the ends of the block diagonal lines C^1 are next drawn, one on each end. These last give the chord of the camber of the blades.

The carving can now be commenced, a start being made by shaping the inside concave curves on the working face of the blades. This should be finished right off with the exception of glass-papering.

The depth of camber should be from one-fifth to one-tenth of the chord, a curve having a versed sine of about one-sixth or one-seventh as being most efficient.

At *B* is shown a plan of the finished screw. *C* shows an end view, whilst *D* is a side view.

It will be noted that the propeller shown has a left-handed pitch. For a twin screw model one left and one right will be required, the right-handed screw having blades with the angles the reverse way to those shown.

Sketch E shows the method of securing the wire shaft in the wood.

Fig. 55 shows a bentwood propeller. At *A* is shown the outline to which the wood, either birch, mahogany, or other suitable hardwood, is cut. The wire spindle is next put on as shown, either as shown at *B* or as at *C*, and the wood is then steamed at the spout of a kettle of *boiling* water. Whilst steam is playing on the wood it is slowly bent and twisted with the fingers, one blade at a time, until the propeller assumes the appearance at *D* or *E*. The angles of both blades must be the same and should be approximately as shown in the drawing.

Of the two forms *B D* or *C E* there is little to choose on the score of efficiency. It is, however, easier to bend the blades when they are turned towards the spindle as at *C E;* on the other hand, they seem to lose their shape and straighten out, thereby lengthening the pitch more easily when subjected to damp than does the other arrangement *B D*.

Fig. 56 is given in order to show one stage in the putting on of the wire spindle. The loop, where it encircles the wood should be gripped firmly in a vice whilst the wire is being coiled off. The spindle should be bent back straight after the first half turn is made, that is to say, when the point is reached which is shown in the drawing.

Kite Flying

In view of the many inquiries received by the Aerial Age concerning kites and their uses, we wish to announce that in forthcoming issues a series of articles on Kite Flying will be presented for the information of our readers. These articles have been especially prepared for the Model News Section by Mr. Cavanagh and it is hoped that the information which they will contain will be of advantage to those who follow this Section of Aerial Age.

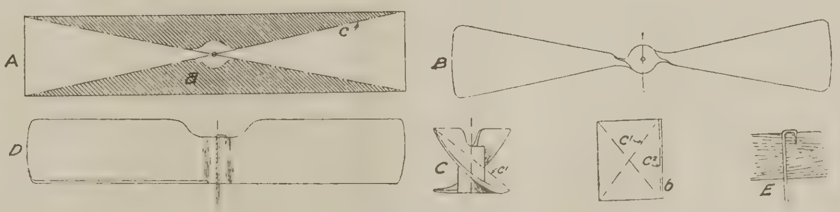


Fig. 54

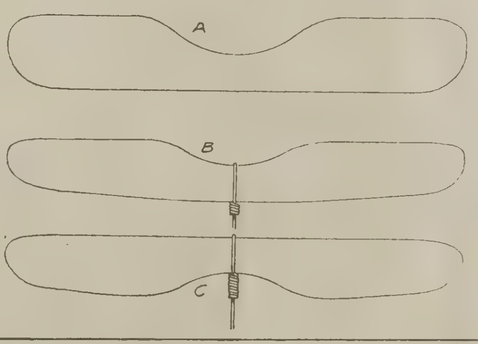


Fig. 55

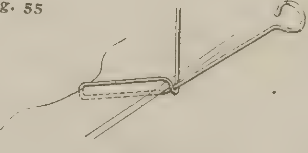


Fig. 56

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Limericks

"Some 'bus" was the old Pterodactyl,
For flying it quite had the knack, till
It first heard its name called,
When it side-slipped and stalled.
Archæologists are on its track still.

! ! !

Said a pupil unto his instructor,
"I want to become a constructor."
Said the other, "My boy,
I don't wish to annoy,
What's more in your line is destructor."

! ! !

A certain young pilot of Pinner,
Got gradually thinner and thinner,
Till at last (it was rummy)
There was not enough "tummy"
To effectually streamline his dinner.

B. O. O. B. (Phila.):

No, it does not matter having the c. g. in the gasoline tank, so long as a reliable filter is used.

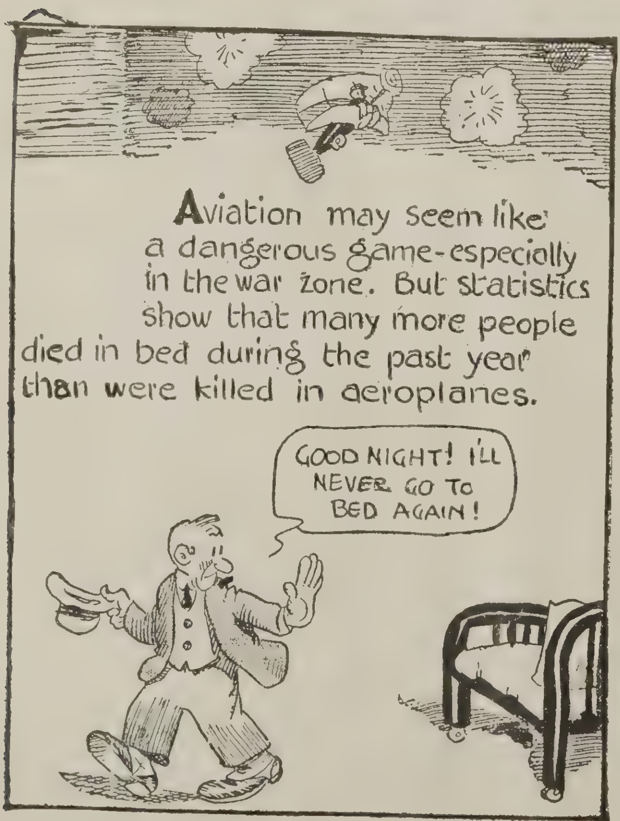
NON-STOP (Springfield):

Yes, the war is still going on, and you are the 9849th correspondent who has solved the problem of perpetual motion.

RIPE (Flatbush):

To convert monoplane figures to biplane figures, use the following formula: $C_2H_5OH + H_2O$.

If the stagger is too pronounced, try more water with it.


Aviation may seem like a dangerous game-especially in the war zone. But statistics show that many more people died in bed during the past year than were killed in aeroplanes.
GOOD NIGHT! I'LL NEVER GO TO BED AGAIN!

PUP:

All pupils are called "pups." We see nothing degrading in it. Don't worry, you'll grow up some day.

THE ZEPP. BOGEY.—MOTHER (*seizing recalcitrant son by the nether garment*): "Now then, young Albert, you come indoors."

HERO: "No—o! Wants to see Zeppelins."

MOTHER: "'Ere, if you ain't a good boy I'll tell the Zeppelins not to come any more."—*Punch.*

THE WATCHER IN THE NIGHT

Up in the night,
Thick blackness around,
And never a sound
Save his engine's roar,
The Airman waits . . . waits . . . waits . . .
Patient as fifty Fates:
His hands are sore,
And his feet are frozen—
Who would have chosen
A task like this
But for the kiss
Of a loved one, lying asleep below,
While he waits aloft for the skulking foe?
Or for England's sake
Does his valour wake,
Where the stars stare bright,
Up in the night?

Up in the night.
Sudden, from distant earth,
Light springs to birth—
Light!
Its pencil pierces, and shifts . . . and stays . . .
And there, in the chill unwinking blaze,
Hovers, perturbed, the Form of Dread!
Swift overhead
The Airman dashes down to his prey:
Nearer he dives, and yet more near,
Till, poised like Vengeance over it sheer,
His moment's come—
His bolt strikes home!
He sees the monster sway,
Tremble, and strive to turn away;
Another bolt he launches . . . and another!
Quick rush the flames along its side,
And, through the smoke and smother,
Come up to him, bursting with joy and pride,
Exulting in the battle,
The thin machine-gun's rattle,
And . . . thinner dreadful cries of agony!
It falls: a streaming flame all down the sky,
In hot air-eddies turning,
And burning, burning, burning!

At last it strikes the earth: a rending crash,
A thunderous roar, a blinding flash
That lights the sky for fifty miles . . .
So . . . *that's* all over.
That ends the fight . . .
His loved one shall sleep safe to-night!
No longer need the Airman hover . . .
He smiles . . .
His work is done,
His battle's won!
Up in the night.

ARGENT. (*Passing Show.*)

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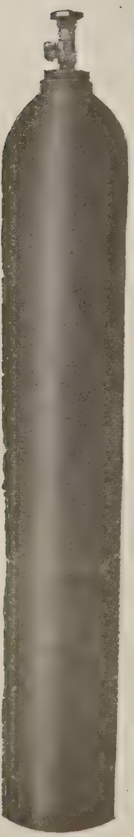

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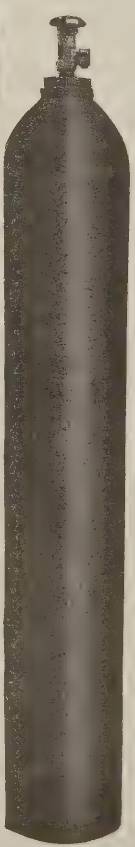

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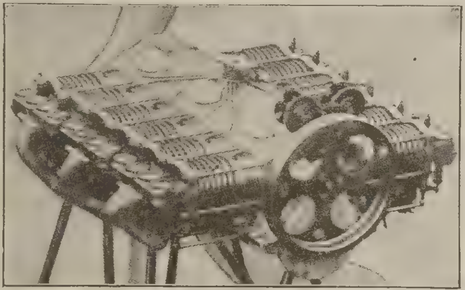

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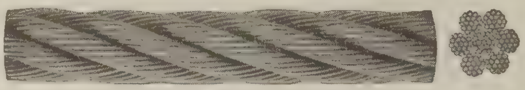

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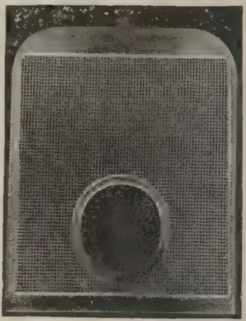

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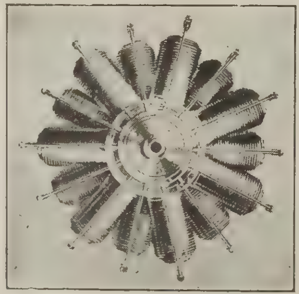

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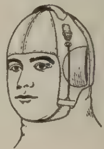

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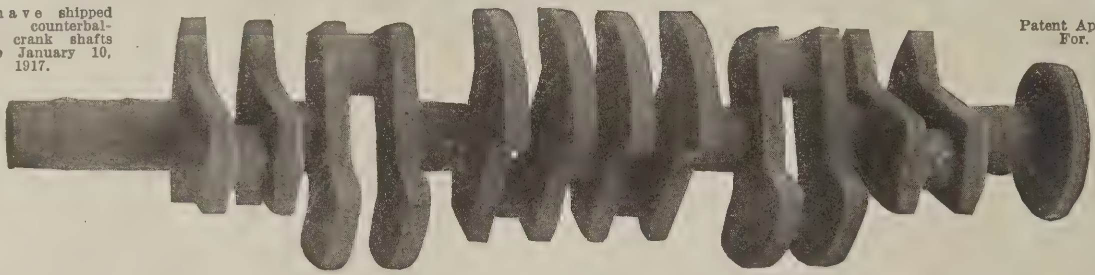

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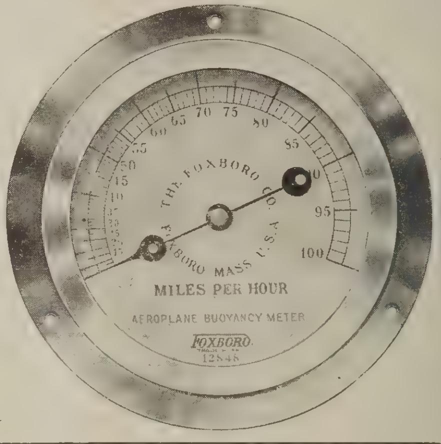

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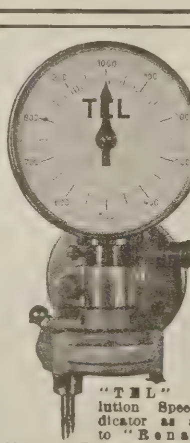

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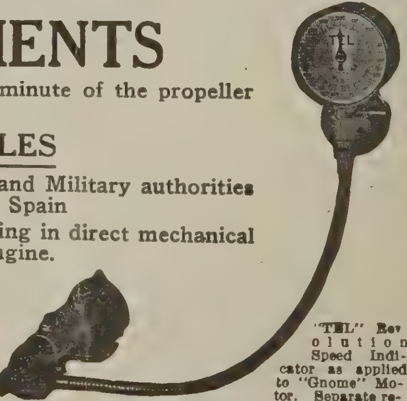

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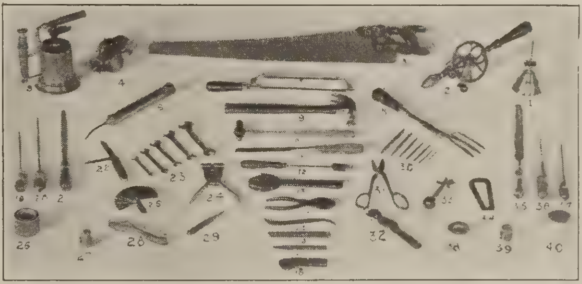
Write, wire or call now and make your reservation for tomorrow may be too late.

A Pilot's Necessity



THE accompanying illustration shows the compactness and completeness of the Cooper Aeronautical Tool Box. With the assortment of tools shown the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

After five years of flying experience these tools have been selected to meet every requirement for Aeroplane service. The size of the box is 28 x 9 x 10 inches.

Single Boxes, $100 — Discount on Quantity

The John D. Cooper Aeroplane Co.
Bridgeport, Conn., U. S. A.

HESS-BRIGHT BALL BEARINGS

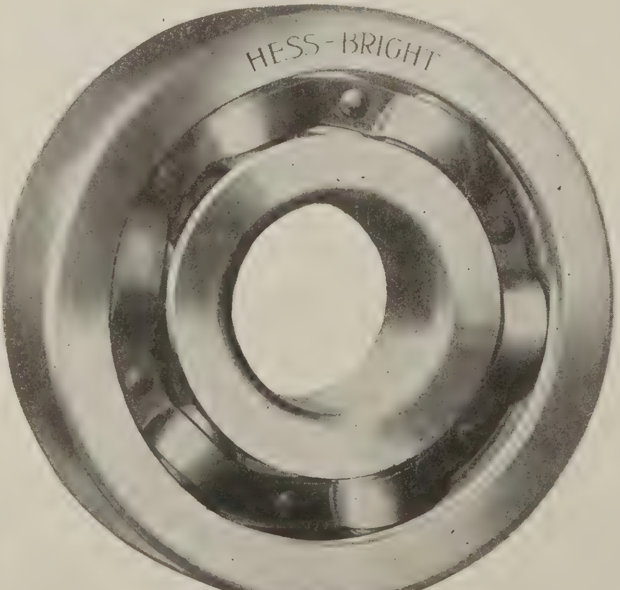
THE intention of some manufacturers is to make purely a quality product—something "BETTER" than merely good. Something that demands recognition of its merit because it embodies and typifies everything that is best.

Then, too, there are come things made merely to sell—things that can be easily sold because they can be purchased at a low price, although they may be good value for the price at which they are sold.

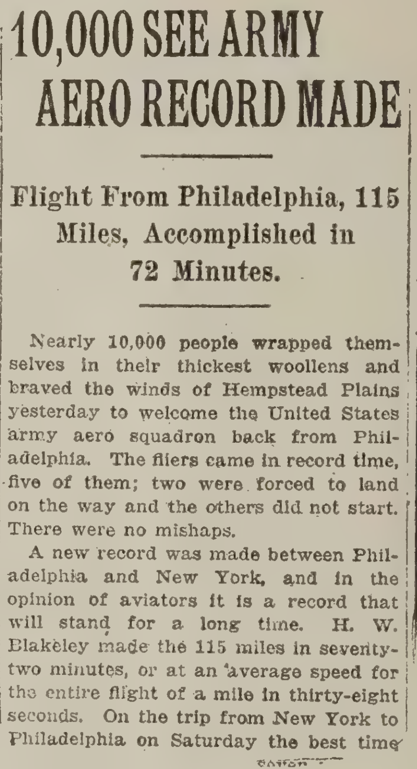
The point we wish to bring forth is this:

INTENTION IS THE DIFFERENCE BETWEEN THINGS MADE TO SERVE AND THINGS MADE TO SELL

The Hess-Bright Manufacturing Co.
Philadelphia, Penna.



A Perfect Score for THOMAS AEROMOTORS



10,000 SEE ARMY AERO RECORD MADE

Flight From Philadelphia, 115 Miles, Accomplished in 72 Minutes.

Nearly 10,000 people wrapped themselves in their thickest woollens and braved the winds of Hempstead Plains yesterday to welcome the United States army aero squadron back from Philadelphia. The fliers came in record time, five of them; two were forced to land on the way and the others did not start. There were no mishaps.

A new record was made between Philadelphia and New York, and in the opinion of aviators it is a record that will stand for a long time. H. W. Blakeley made the 115 miles in seventy-two minutes, or at an average speed for the entire flight of a mile in thirty-eight seconds. On the trip from New York to Philadelphia on Saturday the best time

From Jan. 1st N. Y. *Sun*

This **notable performance** was made possible by a **Thomas equipped** L. W. F. Machine driven by Mr. W. H. Blakeley. **Thomas Aeromotors** throughout the flight to Philadelphia and return showed **consistent reliability** with entire freedom from engine trouble.

Contractors to U. S. Army and Navy.

THOMAS AEROMOTOR CO., Inc.
ITHACA, N. Y.

AEROPLANE LUMBER

(Delivery during the Summer of 1917)

The uncontracted portion of the output of Aeroplane Lumber from the Pacific Coast for the next season is extremely limited.

Through a special arrangement we are able to offer the following:

500,000 feet of Straight Grain Alaska Spruce,

of a quality which will meet the French specifications as follows: Length, 10 to 30 feet; width, 6 inches or wider; thickness, 2 inches or thicker. Sixty-five per cent of this parcel of lumber will be 16 feet and longer.

Price $145.00 per thousand feet, f. o. b. New York. Inspection and acceptance New York.

For five hundred miles north of lower British Columbia the western coasts of Canada are bare of timber, but at the point where the Japanese Current strikes the coast line the spruce begins again. The trees are not as tall nor as great a diameter as the spruce of British Columbia, Washington and Oregon, but the trees are of sturdier growth and there are thirty per cent more grains to the inch. This lot is guaranteed to be the finest and strongest aeroplane timber to be found and this offering practically closes the market of this action.

100,000 feet Long-Length Silver Spruce,

selected for size. Length, 24 feet and longer; width, 6 inches and wider; thickness, 3 inches and more. Straight grain. Graded under G list of Pacific Lumber Inspection Bureau.

Price $155.00 per thousand feet. Terms: Confirmed bank credit at time of entering contract and cash against loading bills of lading. Freight allowed to Atlantic Seaboard.

500,000 feet of Straight Grain Silver Spruce,

from Gray's Harbor, Washington District; of a quality to meet English specifications as follows: Length, 18 feet or longer; width, 6 inches or wider; thickness, 3 inches or thicker. Graded under G list of Pacific Lumber Inspection Bureau.

Price $155.00 per thousand feet. Terms: Confirmed bank credit at time of entering contract and cash against loading bills of lading. Freight allowed to Atlantic Seaboard.

ISRAEL LUDLOW

233 Broadway - - - New York City

TELEPHONE 7870 BARCLAY

AVIATION TRAINING

THE CURTISS School of Aviation will give training this winter, in Florida, to those civilians who may be accepted by the Aviation Section, U. S. A., upon their having made application for enlistment in the Aviation Reserve Corps. Applicants must be between twenty-one and twenty-seven years of age, possess good health, character and college education or equivalent. Tuition will be paid by the Government.

FOR FURTHER INFORMATION WRITE

THE CURTISS TRAINING SCHOOLS

CHURCHILL STREET, BUFFALO, N. Y.

Curtiss Curtiss

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FEB 20 1916

AERIAL AGE WEEKLY

Vol. 4, No. 22 FEBRUARY 12, 1917 10 CENTS A COPY

Pan-American Aeronautic Exposition Tremendous Success

Aero Club of America Asks $50,000,000 Aerial Budget

Exposition Exhibits Completely Described

Standardization of Metal Parts

By F. G. DIFFIN

Suggested Standard Tests for Aeroplanes

By J. J. ROONEY

The Evolution of Aeroplane Wing Trussing

By F. W. PAWLOWSKI

LAWRENCE AIRPLANE

COMBINED LAND and WATER—INHERENTLY STABLE

MODEL A-1 IN FLIGHT NEAR CHICAGO, JUNE, 1916

Announcement

As the result of an exhaustive and thorough course of experimental work, this machine, during 1915 and 1916, demonstrated in more than 150 flights under varied weather conditions, a wide speed range, an exceptionally high gliding angle, extreme simplicity of control, and inherent stability,—all of these flights having been made without ailerons, wing warp or other means of manual control. Two new machines, Model A-1 (speed type) and Model B-1 (load-carrying type) are now under construction and will, at an early date, be ready for demonstration.

Details of performances and constructional features will be published soon.

LAWRENCE-LEWIS AEROPLANE COMPANY
INCORPORATED
Peoples Gas Building
CHICAGO
Exposition Address, Booth 210

Brock Automatic Camera

Type IV, Films
Type V, Glass Plates

Scale Equalizing Printing Machine for Photographic Maps

Field Enlarging Machine

Collapsible Field Darkroom

Drawing Instruments for Mechanically Transposing Photographic Data to Maps

Manufacturer of Specified Equipment
U. S. Army Aviation Section
Signal Corps

ARTHUR BROCK, JR.
Manufacturer of
Optical Instruments and Special Machinery
511 BULLITT BUILDING
PHILADELPHIA

HESS-BRIGHT BALL BEARINGS

FROM the President down, there is a feeling in our plant that we are doing things of which anybody could be justly proud. WE ARE MAKING A "BETTER" BALL BEARING.

Something accomplished — something done—done painstakingly and thoroughly, —this is the spirit that prevails throughout our entire organization. That is why HESS-BRIGHT BALL BEARINGS are "BETTER."

HESS-BRIGHT BALL BEARINGS are what they are because each and every individual connected with this Company, no matter in what capacity he may be, is all the time endeavoring to help make a superior bearing.

The Hess-Bright Manufacturing Co.
Philadelphia, Penna.

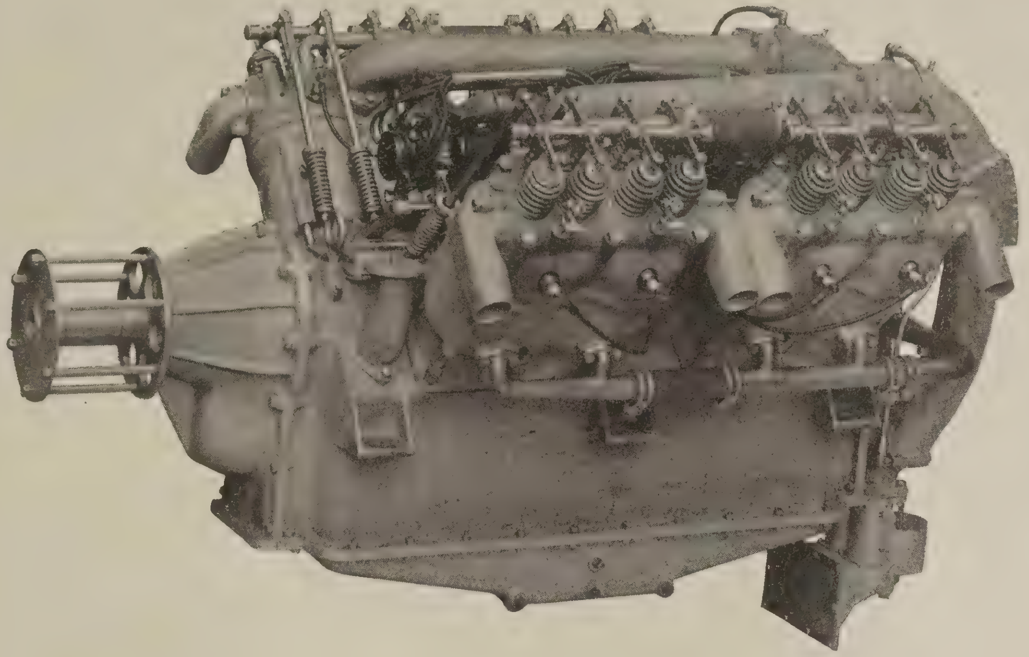
TRADE MARK
HB DWF
HESS-BRIGHT
THE INIMITABLE BEARING

Hess-Bright's Conrad Patents are Thoroughly Adjudicated

The Sturtevant Seaplane

After one year of development—the premier steel aeroplane of the world.

Sturtevant
REG. U. S. PAT. OFF.
AEROPLANE COMPANY
Jamaica Plain, Boston, Mass.



The Sturtevant Aluminum Engine

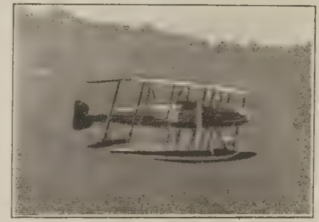
Light and powerful—its thorough reliability, apparent in its simple and substantial details.

Sturtevant
REG. U. S. PAT. OFF.
B. F. STURTEVANT COMPANY
Hyde Park, Boston, Massachusetts

GALLAUDET AIRPLANES

MONOPLANES SEAPLANES
BIPLANES FLYING BOATS

Gallaudet propelled Airplanes and Seaplanes have been adopted by the United States Army and Navy.



U. S. NAVY
SEAPLANES
in FLIGHT

THE Company is prepared to supply all different types of machines as required, but wishes particularly to emphasize the value of machines with its new stream line system of propulsion.

The connection between the front and rear portions of the body and the mounting of the propeller is so rigid and strong that the chance of propeller failure is less than in any other type of propeller mounting.

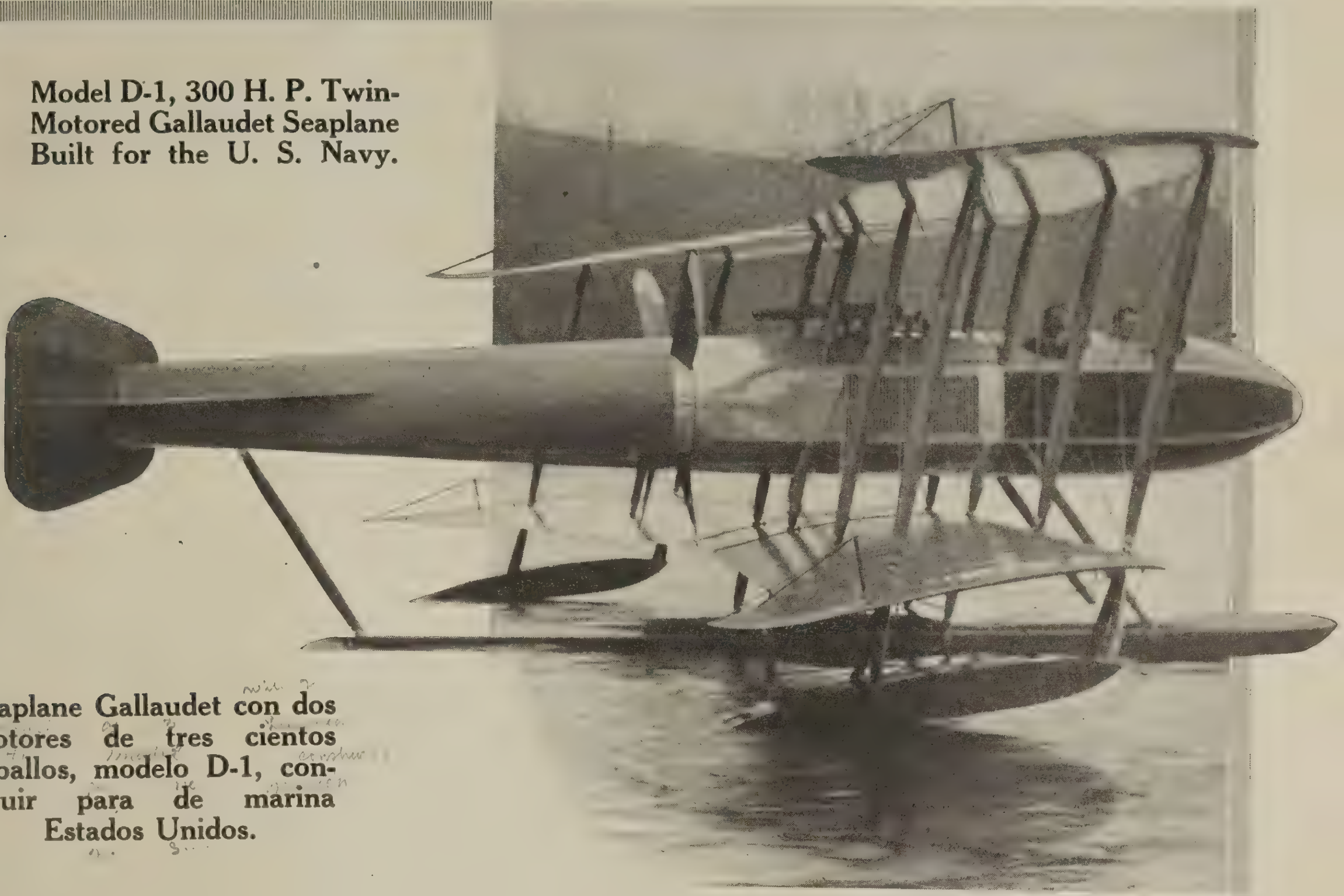
The part of the propeller nearest the center which absorbs power without producing any propulsive effect is inside the body so that the power usually lost in this portion is expended near the tips. The result is an increase in propulsive efficiency of 10% to 20%, according to the relative diameters of body and propeller.

GALLAUDET AIRCRAFT CORPORATION

Factory:
EAST GREENWICH, R. I.

New York Office:
Marbridge Bldg., 1328 BROADWAY

Model D-1, 300 H. P. Twin-Motored Gallaudet Seaplane Built for the U. S. Navy.



Seaplane Gallaudet con dos motores de tres cientos caballos, modelo D-1, construir para de marina Estados Unidos.

Esta Compañia está preparada para proveer todos los diferentes tipos de máquinas que se requierran; pero al mismo tiempo desea marcar especialmente el valor de cada máquina con el nuevo sistema continuado de propulsión.

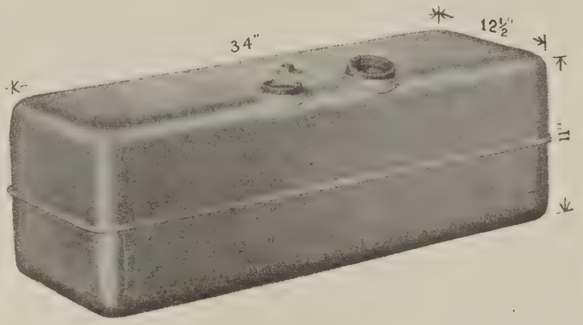
La conección que existe entre el frente y el termino posterior del cuerpo de la máquina y la acción de la hélice es tan rígida y fuerte que el fracaso de la hélice es menor que en cualquiera otra máquina montada con hélice.

La parte de la hélice que está más cerca al centro y que absorbe la fuerza sin producir efecto de propulsión está dentro del cuerpo, así que la fuerza generalmente perdida se gasta a menudo en las puntas. El resultado es del crecimiento de fuerza propulsiva de 10% a 20% de acuerdo con el relativo diametro del cuerpo y de la hélice.

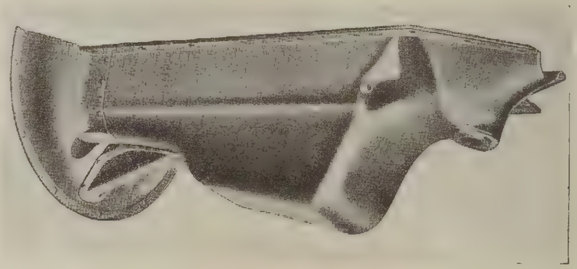
RAYMOND, PYNCHON & CO., General Agents
111 Broadway, New York

PRESSED STEEL PARTS

WE have shown many automobile manufacturers how they could gain in lightness and strength by using pressed steel parts in place of castings. Among the parts we are furnishing are radiator shells, manifolds and oil pans. We also make gasoline tanks and mufflers on a large scale.



20 Gal. Gasoline Tank for Rear.



14 Gauge, 18" Wide, 33" Long, 9½" Deep.

We are prepared to offer similar service to aeroplane manufacturers.

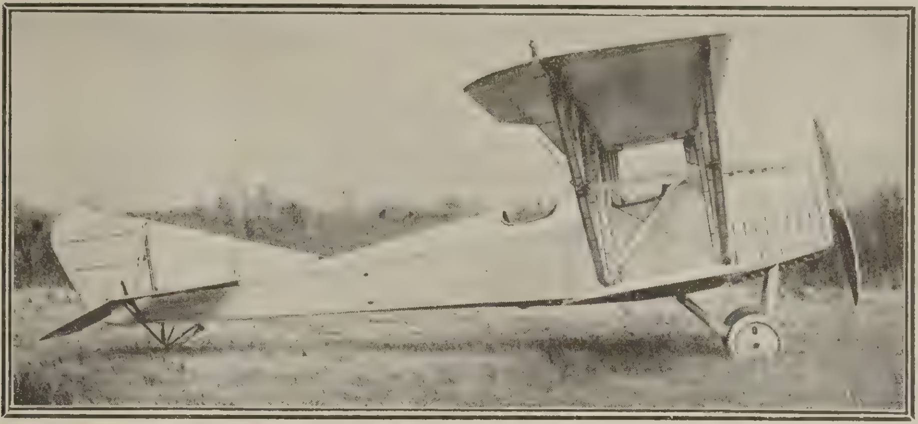
Our modern plant covers 15 acres of floor space and we have had 35 years' experience. It's worth your while to get the benefit of our competition on your work.

Send blue prints or samples for estimate.

GEUDER, PAESCHKE & FREY COMPANY - 1351-1700 St. Paul Avenue
MILWAUKEE, WIS., U. S. A.

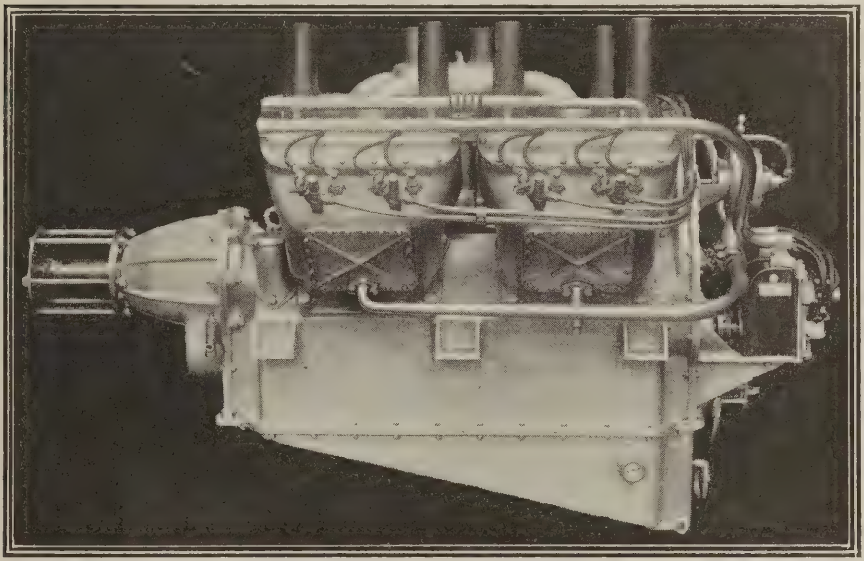
G. P. & F. SERVICE

"KNOWING HOW SINCE '81"



THOMAS D-5 RECONNAISSANCE TYPE

A new **Thomas type** designed especially for military purposes, combining unusual **strength** of **construction, stability** and **controllability.**



THOMAS 135 H. P. AEROMOTOR

With the increased facilities afforded by a **new concrete steel factory** and **additional manufacturing equipment,** we shall be able to meet the ever increasing demand for **Thomas Aeromotors.**

Contractors to U. S. Army and Navy.

THOMAS-MORSE AIRCRAFT CORPORATION

ITHACA, N. Y., U. S. A.

AEROMARINE ENGINEERING
and SALES CO.

Designers and Contractors for
HIGHEST GRADE AIRCRAFT

ANNOUNCING EXHIBIT *MAIN FLOOR*
Pan-American Aeronautic Exposition

GRAND CENTRAL PALACE
NEW YORK CITY FEBRUARY 8 to 15

NEW YORK OFFICE
ROOM 1511, TIMES BUILDING
Telephone, Bryant 6147

"IT'S IN THE SPOKES"

AFTER four years' exhaustive tests, The Ackerman Wheel Company offers to aeroplane builders a wheel of special design that will solve many of the difficulties hitherto encountered.

A series of successful laboratory tests were recently concluded. As the illustrations indicate, the wheel was attached to a large case, into which was loaded 1,500 pounds of sand. A side thrust blow, with the wheel seven feet removed from the point of contact, was calculated to give the wheel a stress of 27,000 pounds. This was when the wheel struck the plain floor surface. To test the wheel to its maximum, two cleats of wood were nailed to the floor, four inches in advance of the striking point, and under this test four spokes of the wheel were broken. Calculation showed that the energy of the blow totalled 49,800 pounds.

A special alloy, specially treated, is used to meet all conditions that the wheel can be subjected to. The steel receives a special process in the treating, so that it will give the required resiliency, starting at the center of the curve and gradually growing stiffer and stronger both to the hub and relative to the structure of the spoke. The spokes being made on the curve, they are hung on the hinge at the rim, being a unit in the hub, allowing them to open and shut according to the load placed on the hub.

In the aeroplane wheel it is found that the hub will leave the center four inches when maximum loaded, and return to center as load is decreased, without the springs taking a set. There has never before been a wheel invented which would meet any such conditions.

These wheels can be built according to size and weight of any load from 500 pounds up.

Write for complete information to

THE ACKERMAN WHEEL COMPANY
ROCKEFELLER BUILDING
CLEVELAND, OHIO

Figure 1

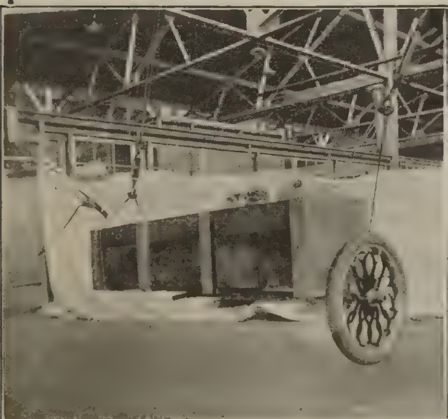


Figure 2

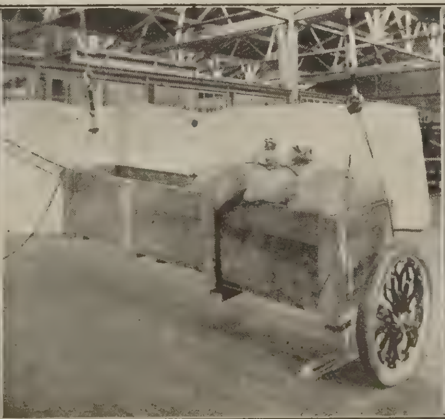
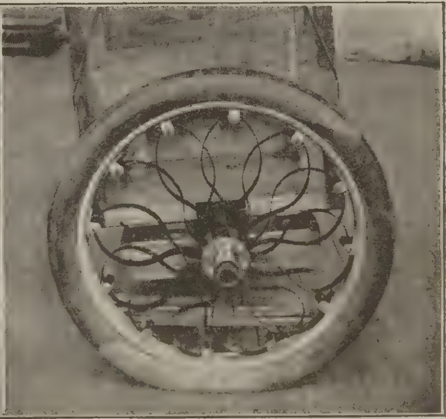


Figure 3



Exhibiting at the PAN-AMERICAN AERONAUTIC EXPOSITION February 8 to 15

What can Delco do for Aviation?

Let's discuss that at the Exposition. There will be a Delco Exhibit there for that very purpose. Delco engineers and investigators will be in charge. You will find them ready to take up your problems with you—eager to learn in what way they can help you. Personal acquaintanceship, we believe, will be as much to your advantage as our own.

Delco has faith in Aviation—A vision of big achievements and practical applications—not in the dim and distant future, but close at hand. And Delco faith is backed by Delco willingness to play its part—to place its resources, its knowledge, at the service of those who are pioneering their way through the problems that must be solved.

Delco brings much to Aviation. Facilities for research? Yes. Delco laboratories stand second to none in aiding Science—giving a free hand, full sway, and unlimited opportunity for expert experiment.

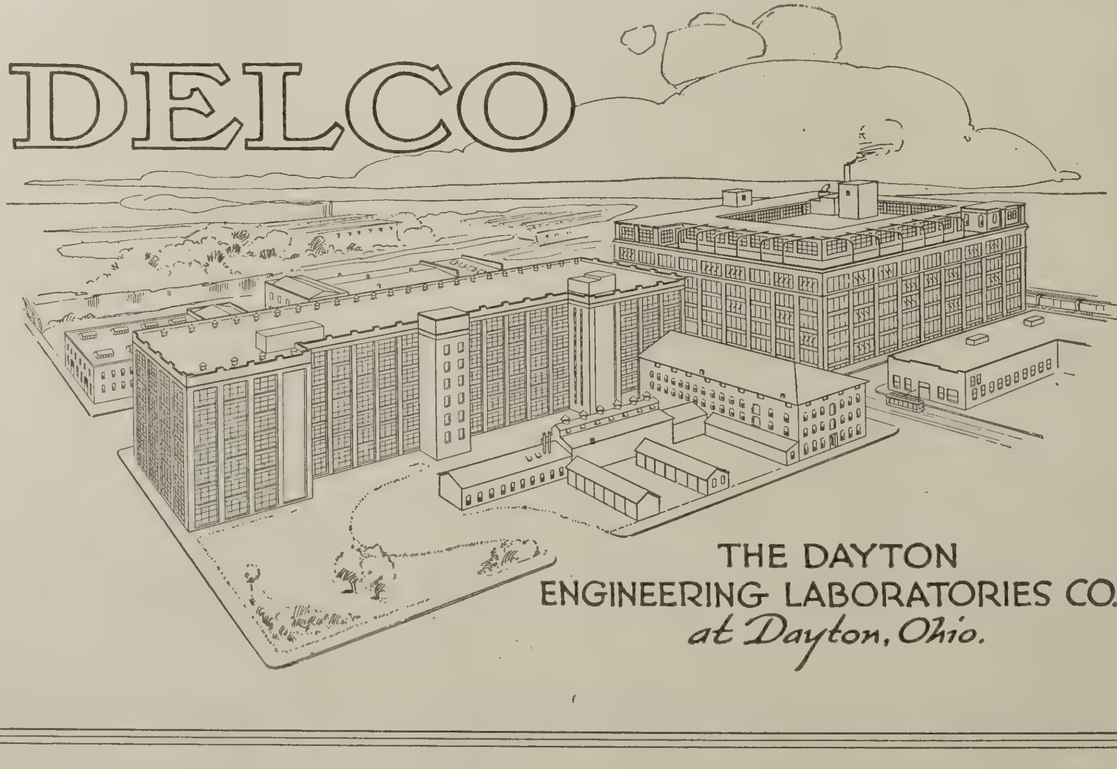
Ability to manufacture? Yes. From a barn-loft laboratory four years ago, working on an unknown product, to a wonder-plant in 1917 with half a million automobiles, Delco equipped, is evidence of Delco ability and output.

But what is even more important still—the Spirit—the Ideal, too, is there—*to serve first and, only after serving, to reap the reward that service warrants.*

Delco invites you—offers its co-operation. Delco has no special propaganda to promote—no theories to establish. We're at this exposition just as you are—to see the progress aviation is making—to meet the men on whom its future rests—to show what we ourselves are doing—to join in every move that helps its growth.

Meet us at the Grand Central Palace. We think you'll find us worth a visit and know that we have much to learn from you

DELCO



THE DAYTON
ENGINEERING LABORATORIES CO.
at Dayton, Ohio.

The Solution of the Greatest Problem in Aviation

AT THE SHOW

The

Martin Aerodynamic Stabilizer

Safety for your Aeroplane and freedom from Wright patent infringement

The Martin Aerodynamic Stabilizer is not an experiment, but has been submitted in actual flight to the severest tests.

It is built entirely of Aerometal, a light, strong, non-corrosible metal; is simple, having but three movable parts, and cannot get out of order.

It weighs less, and creates less head resistance than the standard controls it replaces.

It relieves operator of all concern for the lateral balance of the aeroplane, and takes its own definite bank on turns.

The only way an aeroplane equipped with Martin Aerodynamic Stabilizers can be made to roll is by operator steering alternately from one side to the other.

The structural and operative features embodied in the Martin Aerodynamic Stabilizer have been defined by the United States Courts as those which do not infringe the Wright Patent.

The device is fully protected by patents pending in all countries, and license is furnished with each installation.

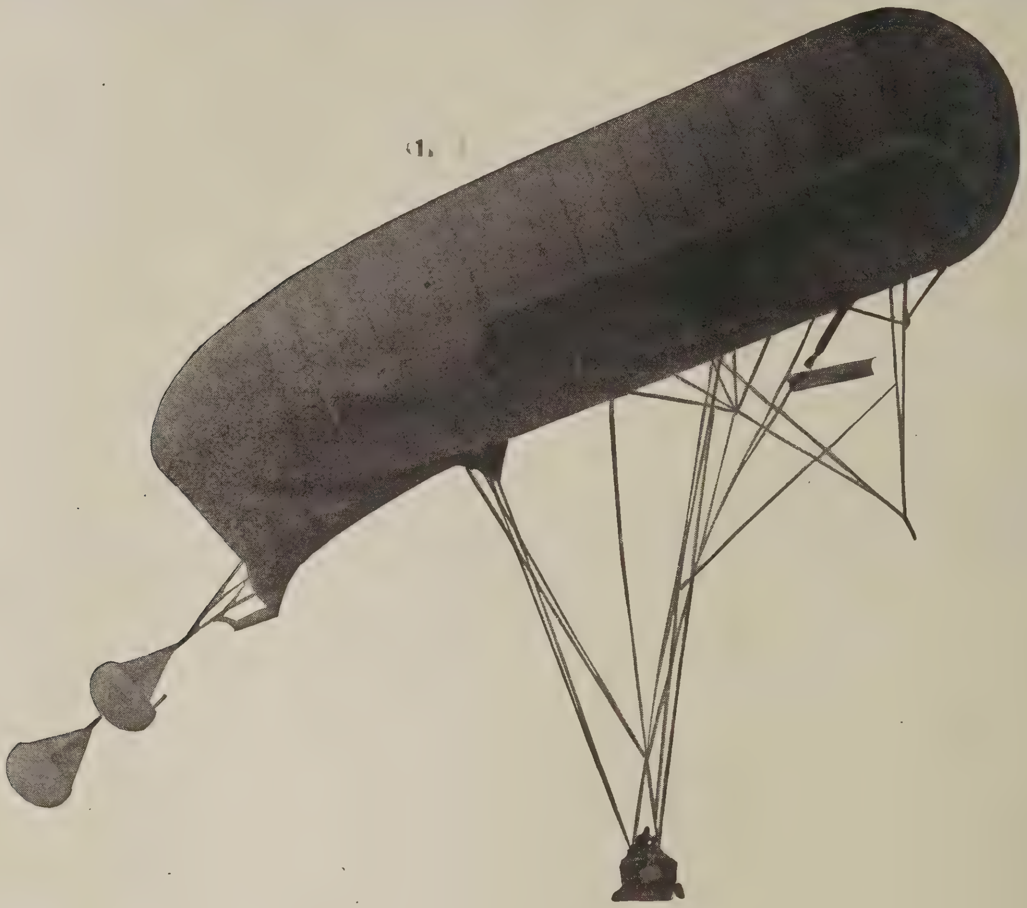
In November, 1916, an American Army Aeroplane equipped solely with this device made the first flight in the history of aviation, without the operator having available either warping or other lateral control.

The flights embraced spirals, dives, figures of eight, landings with and across the wind, and a cross-country flight of 150 miles with passenger.

NOTE: The Aerodynamic Stabilizer is the invention of Capt. Jas. V. Martin, the American Master Mariner and pioneer Aviator, who originated, built and demonstrated the first successful Tractor Biplane in America. He has no connection with the Glenn L. Martin Company of Los Angeles or the Wright-Martin Aircraft Corporation.

THE MARTIN AERODYNAMIC STABILIZER

ELYRIA, OHIO, U. S. A.



The Goodyear Contribution

No exhibit at the Aeronautical Show can be regarded as a mere display of merchandise.

The smallest piece of minor equipment, every unit of machinery, as well as each aeroplane and balloon are all sublime testimony to the dauntless spirit of man. All are steps toward perfection in the conquest of the element so long unconquerable.

To the manufacturer as well as to the daring men and women who are advancing that conquest a shock absorber has as deep an interest as a life-guarding tire.

A fragment of newly developed balloon fabric is as vital as a new type of kite balloon which may serve as precious eyes for our defending armies.

Every exhibit is evidence of the contributions manufacturers are making to a far greater thing than mere technical development.

It is in this spirit that the Goodyear equipment is shown, for it is the spirit which caused its development.

When record breaking flights are made with aeroplanes Goodyear-equipped, such as those of Victor Carlstrom and Miss Ruth Law, the Goodyear organization feels well rewarded for its labor.

Not merely because its products have been notably endorsed, but rather because the Goodyear effort has been proved worth while.

Not only toward aviation is the Goodyear energy directed, but also toward that instrument of aerial mastery which the great war is justifying anew, the balloon.

For the dirigible and the kite balloon have truly come into their own, not as instruments of destruction, but as eyes for army and navy.

Since the amazing revelations in Europe the Goodyear activity which produced the prize-winner in the last great International Balloon Race before the war, has been intensified.

One of the latest results is the new kite balloon—80 ft. long and of 25,000 cu. ft. capacity—which represents a substantial advance in this type of construction.

It will not shift, veer or yaw, even in a stiff gale.

The research and engineering skill which produced it, have also produced spherical, and dirigible balloons of any size and every type, aeroplane tires, bumpers, rims and other aeronautical supplies—all shown at this year's exhibit.

The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR
AKRON

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AERIAL AGE
WEEKLY

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FELIX PAWLOWSKI (Instructor in Aeronautics University of Michigan)
Contributing Technical Editors

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VOL. IV NEW YORK, FEBRUARY 12, 1917 No. 22

AERO CLUB OF AMERICA ASKS $50,000,000 AERIAL BUDGET

THE Board of Governors of the Aero Club of America, after considering the report that the House Committee on Military Affairs in reporting the Army appropriations had only allowed $8,000,000 for military aeronautics and $1,000,000 for aeronautic stations, passed the following resolution, copies of which were ordered sent to the Senate and House Committees on Military Affairs, the Secretary of War, the Council of National Defense, the National Advisory Committee on Aeronautics, and made public.

The resolution reads as follows:

"Whereas: The House Committee on Military Affairs in reporting the Army appropriations has only allowed Eight Million Dollars for military aeronautics and One Million Dollars for aeronautic stations; and

"Whereas: For the upbuilding of our defenses it is necessary to train and equip immediately one thousand aviators and one thousand operators of observation balloons; and

"Whereas: To train one thousand aviators and one thousand balloon operators there are needed ten permanent aviation stations and ten permanent aerostatic (kite balloon and dirigible) stations; and there are needed three aeroplanes for each of the aviators—which is the number of aeroplanes allowed each aviator by other countries; and

"Whereas: For the purchase of the grounds and equipping the twenty stations, there is needed about twenty million dollars; and for the purchase of the three thousand aeroplanes to equip the one thousand aviators an amount approximating Thirty Million Dollars will be required;

"Be it resolved that the Board of Governors, here assembled, present the above mentioned facts to the Senate and House Committees on Military Affairs, Secretary of War Baker, the Council of National Defense, the Advisory Committee on Aeronautics, and the American public, and urge that the appropriation for Military Aeronautics be increased to Fifty Million Dollars to provide for the expansion in the Air Service which is so badly needed to meet the national emergency."

The Governors present were: Messrs. Alan R. Hawley, President; James E. Miller, W. Redmond Cross, Charles Jerome Edwards, Cortland F. Bishop, Evert Jansen Wendell, Major F. L. V. Hoppin, Raymond B. Price, Henry Woodhouse.

PATRIOTIC CO-OPERATION

UPON receipt of the information regarding the break with Germany, the Aero Club of America promptly communicated with General Leonard Wood's office at Governor's Island and offered its entire resources for the developing of the air service. Following is a copy of the letter written by Mr. Alan R. Hawley, President of the Aero Club of America, to Major General Leonard Wood, outlining the plan of action which has been drawn up by the Club and submitted to him for approval:

"My dear General Wood:

"(1) Confirming our telephone conversation with your office, the officials of the Aero Club of America, realizing the necessity of taking prompt and energetic steps to mobilize and develop the aeronautic resources of the East, and realizing that your Department must be literally loaded with work, have outlined the following plan for developing the aerial defenses of the East, and submit same to you for your approval or modification.

"(2) In outlining the plan, we gave close consideration to the status of available aeronautic resources in the East. We also conferred with some of the aviators available in the East and authorities in the different fields from which we must draw for personnel and material and assistance—and have developed this plan with a view to taking as little of your Department's time as possible. In other words we shall try to make a plan that we can carry out in its entirety under your orders and supervision, or carry out any part of it which you decide should be caried out by us, leaving the rest to your Department.

"(3) We have taken as a working basis that we should work to get 1,000 aviators under training as quickly as possible and give advanced training to as many aviators as possible.

"(4) The present status of military aeronautics is as follows:

"(a) The National Defense Act of June 3, 1916, limits the number of Army aviators for 1917 to less than 100.

"(b) The law provides for the Aerial Reserve Corps, wherein there can be enlisted an unlimited number of aviators, who can be civilians or militiamen.

"(c) The National Defense Act also provides for the training of the militia and organizing and equipping, under the direction of the Army, as many aero squadrons as there are Militia Divisions. The Aviation Section of the Army has about $6,000,000 of unexpended funds for aeronautic purposes.

"(d) There are at present about fifty candidates for the Aerial Reserve Corps under training, divided between San Diego Army Aviation School, the Memphis Army Aviation School, the Newport News Aviation School, the Miami Aviation School, and the Mineola Army Aviation School. These five schools have training facilities for at least three hundred aviators. Governor's Island, which, on account of its location, should be a station for advanced training, can accommodate up to 25 aviators. There are about fifty Militia officers trained or under training, and about fifty civilians and militia officers who should have trained and have applied or are ready to apply for admission in the Aerial Reserve Corps. There are, therefore, less than 200 aviators trained or under training under the Army's control.

"(e) Believing that the Aero Club of America can best assist by securing recruits for the Aerial Reserve Corps, an appeal is being made by the Club for recruits for both the flying and the mechanical side of the Aerial Reserve Corps, also for the operation of kite balloons and the training of advanced aviators in aerial gunnery, bomb dropping, and operating aeroplane wireless.

"(f) We will do all the detail work of registering the recruits, then will refer them to an officer to be appointed by you, who will order them before a board of physicians for medical inspection, who will pass upon their fitness for the air service, after which they will go before the Examining Board, which will pass upon their qualifications for any branch of the air service.

"(g) After the recruit has been accepted, he is sent to one of the training schools, which can be Mineola for the Eastern Department, or, if he is a mechanic, can be sent to either Mineola or one of the aeroplane factories for training.

"(h) The authorities of the Aero Club of America will also be glad to assist in the preliminary training of recruits. We shall also be glad to assemble in pamphlet form, with illustrations, all information which we have regarding the application of aircraft for military purposes and distribute these pamphlets among the recruits, so that they may get a general idea of how things are done in Europe. We have copies of manuals of the air services of different countries, which can be used to advantage for this purpose. Also numerous photographs illustrating important points.

"(i) For the advanced training, realizing that there are only half a dozen men in the United States who know anything about aeroplane guns, we have taken steps to secure three of the highest authorities on the subject, who, we feel, will be glad to place themselves at your disposal. Also realizing that there are only two or three authorities on wireless telegraphy from aeroplanes, we have taken steps to secure one of these authorities, and we have already accumulated some very important data regarding the employment of radio from aeroplanes, which can be printed and distributed, thereby giving the aviators a rudimentary knowledge of the subject. The same is true of aerial photography, and other important phases of military aeronautics.

"Our one aim is to offer our services for the upbuilding of our aerial defenses, and we are at your disposal to do anything which you may command us to do."

The officers of the Aero Club also took stock of the aeronautic resources and considered plans for possible immediate expansion of the air service. A telegram was sent to Secretary of War Baker by Mr. Alan R. Hawley, President of the Club, offering to assist the War Department in getting aviators and aeroplanes for the air service.

The officers also considered a telegram received by the Club advising that the House Committee on Military Affairs was proposing to cut down the estimates for aeronautics because the Aviation Section of the Army had failed to spend the fourteen million dollars appropriated for military aeronautics at the last session.

President Hawley telegraphed Congressman S. Hulbert Dent, Chairman of the House Committee on Military Affairs at Washington, D. C.

"Present situation shows necessity of immediate provision for twenty aero squadrons, equipping the 73 forts and 45 field artillery batteries with kite balloons, and scouting type dirigibles, which can quickly be obtained. An appropriation of fifty million dollars for aeronautics and a law permitting the employing of the necessary number of civilians in the Army Air Service, will make it possible to give the United States Army one thousand trained aviators and an efficient aerostatic service. At present the 73 forts and 45 field artillery batteries have no aerial eyes, and the territory which they should protect would be at the mercy of the long-range guns of battleships lying beyond the point of vision of the artillery observers. Each fort should have at least two kite balloons, and there should be half a dozen scouting type dirigibles for each of the six coast artillery districts."

The same telegram was sent to Senator George E. Chamberlain, Chairman of the Senate Committee on Military Affairs, with the following addition:

"Please advise the Aero Club of America as to what steps it should take to assist you in your patriotic work of instituting universal training in the United States. The experience of the past year has shown that the work of developing our defenses is held back by the shortage of officers and men in the Regular Army, and that the Aerial Reserve Corps cannot afford the training required to make either good aviators or officers to hold executive positions in the air service.

"Although it is a year since the Mexican trouble showed the necessity of getting a thousand aviators in the Army, we have today less than 100 Army and Aerial Reserve aviators. Twice that number are needed to take care of the administration of the air service and the training of one thousand aviators. Universal training is the only solution of the problem."

Mr. Hawley pointed out that under the present law the Army cannot even get 100 aviators during the year 1917, and the number of superior officers to take care of the administrative work of expanding the air service that the training of the 500 aviators for the Aerial Reserve Corps which was authorized by President Wilson on July 13, 1916, has been deferred throughout these months, and there are less than fifty reserve aviators under training. The Aviation Section of the Army is understood to have received upwards of 1,500 applications from volunteers who are anxious to join the Aerial Reserve Corps. The Aero Club of America alone received and referred to the Aviation Section of the Army about 2,000 applications. The Club turned over to the Aviation Section of the Army hundreds of application from civilians and National Guardsmen who applied for training at the time of the Mexican trouble. But no steps were taken to send the men to the civilian aviation schools which had prepared to train them during last summer and fall.

So today, we find that although the Army has ordered several hundred aeroplanes, it has hardly any aviators under training. It is understood that plans have been made for sending a hundred or so of Aerial Reserve Corps applicants to school in the early part of the spring. In view of the critical situation, steps should be taken immediately to put as many aviators under training as the schools can take care of, and immediately establish other schools, so that one thousand aviators can be trained in the immediate future. No steps whatever have as yet been taken to give the aviators training in aerial gunnery, the use of machine guns, wireless telegraphy, bomb droping, and aerial tactics, which aviators must have today. Nor have any aviators been trained in flying in winter conditions. Steps should be taken immediately to train aviators at Mineola and elsewhere so that they will be able to render service under any weather conditions.

The Curtiss Autoplane

THE immense crowds that visited the Pan-American Aeronautic Exposition for the formal opening function found many exhibits which aroused their amazement. The Governor's party had the old and the new brought into close contact for their comparison immediately they entered the Palace, for in the Wright-Martin Section there was exhibited the original Wright biplane, which represented the practical conquest of the air by man side by side with the modern Wright-Martin military tractor biplane equipped with the Hispano-Suiza motor.

But it was when the party reached the Curtiss Section that the surprise of the Show was unveiled—the Curtiss Autoplane —literally the limousine of the air.

It was the subject of much comment and it brought home to the lay mind in a way more forcible than any other possible the fact that aerial cruising for pleasure as well as commerce will soon be an accepted fact.

The machine is a triplane of moderate wingspread, equipped with a 160 h.p. motor, and with pusher propeller. The body is a miniature limousine, completely enclosed, and finished within in most luxurious fashion.

Already the sportsmen who have seen it are enthusiastic, and the summer will undoubtedly see it as popular as has been the flying boat during past summers.

THE NEWS OF THE WEEK

Yale Men Offer to Serve as Aviators

Aerial Coast Patrol Unit No. 1, composed of students in Yale University, has offered its services to the Navy Department and is awaiting orders. F. Trubee Davison, son of Henry P. Davison, one of the members of the Morgan banking firm, is head of the unit.

President Alan R. Hawley of the Aero Club sent a formal offer by wire to Secretary Daniels, saying the unit was ready to obey orders from the Secretary of the Navy.

The unit will leave college immediately and take up advanced training in naval aeronautics. The unit already owns four seaplanes, and other machines of the latest approved navy type are under order for it. The unit was organized last July and took an active part in the fleet manoeuvres last fall.

The members are F. Trubee Davison and Henry P. Davison, Jr., sons of Mr. Morgan's partner; Robert A. Lovett, son of Judge Lovett, chairman of the board of directors of the Union Pacific Railway; John Vorys, John Farwell 3d, Albert Ditman, Wellesley Laud Brown, Artemus L. Gates, Erl C. B. Gould, Allan Ames, C. D. Wimans and A. D. Sturtevant. David H. McCulloch and W. F. Sullivan are their instructors.

During the fleet manoeuvres in September two members located the attacking torpedo boat fleet in a thunderstorm, landed safely and reported the location of the fleet by telephone. They flew at a height of 3,100 feet and were not seen by the fleet through the storm clouds. During their course at Yale this winter the members have been studying naval aeronautics at the New London navy yard.

Offers Nation Use of Aeroplane Plant

The United Eastern Aeroplane Corporation, of Brooklyn, in a letter to the War Department sent by the corporation's president, Edward F. Marshonet, offered the United States Government the use of its factories and aviation school in the event of war.

Bridgeport to Be Aeronautical Base

Orders received from the War Department arrange for the immediate formation of an aeronautical section of the Connecticut Naval Militia and names Bridgeport as the aeronautical base of the State. Full equipment, consisting of hydroplanes, hydroaeroplanes, Lewis machine guns, hangars and the like, will be supplied by the government as soon as licensed fliers have been accepted by the federal authorities.

One officer and four men will be sent to the training station at Pensacola, Fla., for three months, beginning March 1.

Lieut.-Col. Squier's Appointment Confirmed

The nomination of Lieut.-Col. George O. Squier, Signal Corps, U. S. A., to be Chief Signal Officer of the Army with the rank of brigadier general for four years from Feb. 14, 1917, vice Scriven, retired, was confirmed by the Senate on Jan. 19, 1917. General Squier has received well deserved advancement and the Signal Corps secures at its head an energetic officer of high scientific attainments. Among the important researches made by General Squier are the following: Electro chemical effects due to magnetization; the polarizing photo-cronograph; the sine wave systems of telegraphy and ocean cabling; the absorption of electro-magnetic
erico and reconnoissances were made.
waves by living vegetable organisms, multiplex telephony, etc. General Squier, who has been attached to the aviation section of the Signal Corps, was born in Michigan, March 21, 1865, and is a graduate of the U. S. M. A., class of 1887, when he was promoted in the Army second lieutenant, 3d Artillery. He was appointed a first lieutenant in the Signal Corps Feb. 23, 1899. He took a course of instruction in electric engineering at Johns Hopkins University and holds the degree of Ph.D. from that institution. He has served as instructor in the department of electricity and mines at the Artillery School, Fort Monroe, Va., and was signal officer of Department of the East. During the war with Spain he served as a captain and lieutenant colonel and signal officer of Volunteers, and was chief signal officer of the 3d Army Corps. General Squier served in the Philippines, 1900-1902, through the entire rebellion. He is also a member of the Royal Institution of Great Britain. General Squier was chief signal officer of the maneuvers division on the Texas border in 1911, and also wrote the specifications for the first aeroplane bought by any government (the Wright machine), and was the first passenger ever carried in an aeroplane.

Lieut.-Col. Bennett Heads Army Aviation Section

Lieut.-Col. John B. Bennett has been selected to succeed George O. Squier as chief of the aviation section of the Signal Corps. Official announcement of the appointment will be made by the War Department within a few days.

Col. Bennett will be promoted to the rank of colonel when the appointment is made.

Long Flight of Naval Balloon

An extended flight by American naval officers in a naval balloon was completed January 31st, by Capt. Geiger and Lieut.-Commander McCrary, who landed at Darien, Ga., after a fourteen-hour trip from the aviation station at Pensacola, Fla.

Seaplanes for Panama and Honolulu

According to a press despatch under date of February 2nd, it is stated that Captain John F. Curry of the San Diego Aviation School, is authority for the statement that huge seaplanes, with a wing spread of seventy feet and motors developing 400 horsepower, will form the flying equipment of the sixth and seventh squadrons at the Canal Zone and Honolulu.

Each squadron will be equipped, it is stated, with sixteen planes and the personnel of each will be eighteen officers and 168 mechanicians.

Captain Henry H. Arnold, who will be commander of the Seventh squadron, will leave shortly for the Canal Zone to inspect sites for the aero base there.

Aeroplanes Cover Pershing Retreat

Because of rumors that Villa forces were close on the heels of Pershing's retiring troops, and occupying the camps as soon as they were evacuated, cavalry patrols and aeroplanes have been used in numerous reconnoissances. Two machines were held at Dublan until Jan. 30, and flights were made far south of El Valle. A temporary base was then established at Ojo Federico and reconnoissances were made.

Orville Wright Predicts Air Route to National Parks

That the national parks are now real magnets which induce Americans to become acquainted with their own country, was particularly accentuated on "Motoring Day" of the Washington conference conducted by the Department of the Interior. At the request of Secretary Franklin K. Lane, the American Automobile Association took in hand this phase of the week's sessions, which covered every possible angle of national parks management and progress.

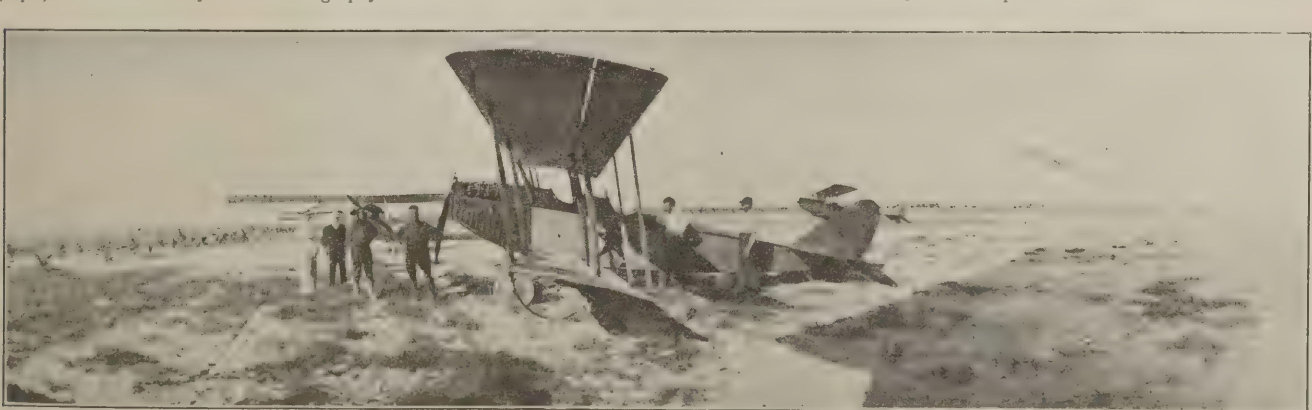
Orville Wright predicted that the air routes to the national parks were certain to be well patronized in the comparatively near future, and thus referred to this form of travel: "But in order to visit the parks by aerial routes, suitable landing places will have to be provided, enther within the parks themselves, or in the closely adjacent country. In the plains west of the Mississippi and east of the Rockies, landing places can be found almost anywhere. But in the mountainous and hilly regions of the Far East and West they are not so plentiful. Here suitable landing places will have to be prepared, or those already existing must be found and marked, so as to be easily recognized from distances of five and ten miles. In Crater Lake Park, and probably in some of the others, are bodies of water large enough for landing with aeroplanes equipped with hydroplanes.

"No matter by what route we arrive, however, our national parks must be viewed from the ground to be appreciated. The giant Sequoia, when viewed from on high, will be no more impressive than the modest shrub, and the Grand Canyon of the Colorado will flatten out almost to a plain. Though the shining river will be seen winding its tortuous way in a mass of variegated colors, the grandeur of the gorge in size and sculpture will be gone."

Spontaneous Petrol Explosion

It was stated in an article in some paper recently that by pouring gasoline through a chamois in a funnel electricity was generated, set fire to the gasoline and severly burned a man pouring the gasoline.

The possibility of this occurence has been demonstrated. An explanation is given as follows: Let us assume that you are about to fill your tank. The funnel is in the nozzle. A chamois strainer is in the funnel. The gasoline is turned on and as it pours through the chamois it generates static electricity. Static electricity may be defined as electricity that is at rest. Static electricity, as we have said, is now in the funnel. The funnel is charged with it. So long as the funnel fits securely into the mouth of the tank, thus creating a "ground," you are safe. Now, let us assume that you did not allow the funnel to rest inside the nozzle of your tank, as the gasoline seeped through the chamois skin. Either yourself or some one else held the funnel in mid-air, or it rested free of the sides of the tank. No "ground" was formed. We have seen that gasoline, a volatile substance, passing through chamois form static electricity, which charges the funnel. When the amount of electricity is sufficient to produce a jump spark, that spark jumps to the nearest "ground," which is your tank. In doing so it must pass across the opening between the end of the funnel and the edge of the tank through which gasoline vapor is rising. The moral to be derived from this article is this: Do not put gasoline through chamois skin. But if you will insist on taking chances be sure that you have a "ground" on it, by seeing that the funnel touches the opening of the tank. Be doubly sure that you take this precaution.—London Aeroplane.



The flying field of the Curtiss Aeroplane & Motor Corporation, at Miami, Florida, with one of the school machines in the foreground.

Army and Navy News

Lieut. Commander H. C. Mustin, detached Naval aeronautic station, Pensacola; to home and await orders.

Sergt. Carl T. Hale, S. C., San Diego, Cal., to Columbus, N. M., for duty with the 1st Aero Squadron, Signal Corps. (Jan. 23, War D.)

A board to consist of Capts. Hiram A. Phillips, M. C., Thomas S. Bowen, Bert. M. Atkinson and Carl Spatz, Aviation Section, S. C., and 1st Lieut. William F. Rice, M. C., at Fort Sam Houston, Texas, for the purpose of examining persons for appointment in the Aviation Section, Signal Officers' Reserve Corps. (Jan. 8. S.D.)

Sergt. Major (J.G.) George B. C. Kuster, C. A.C., Fort Williams, Me., is transferred as private to the Signal Corps. His appointment as sergeant first class, Signal Corps, is announced on day following date of transfer. He will be sent to Fort Omaha, Neb., for duty at the U. S. Army Balloon School. (Jan. 18. War D.)

First Lieut. Lewis H. Brereton, C. A., attached aviation section, Signal Corps, as an aviatian officer, report to commanding general. Philippine Dept., for assignment to duty with 1st Co., 2d Aero Squadron, Signal Corps.

An attempt to recover the military aeroplane abandoned by Lieut. Col. Harry G. Bishop and Lieut. W. A. Robertson, Jr., U. S. A., on January 10, in the Sonora, Mexico, desert, near the headwaters of the Gulf of California, will be made by the sailors of the U. S. S. New Orleans, acording to an announcement made at the Army aviation school, San Diego, Cal., on January 31. Col. W. A. Glassford, U. S. A., commandant at the school, recommended to the War department that this method of recovering the lost plane be adopted. The War Department approved the plan, and atuhorized Colonel Glassford to confer with Admiral W. B. Caperton. The New Orleans, now at Guaymas, Sonora, has been ordered to search for the plane. According to Lieutenant Robertson, it was abandoned about fifty miles south of the head of the Gulf and several hundred feet from the shore. The plane, if found, will be dismantled and brought to San Diego on board the cruiser. An Army board investigating the flight of Colonel Bishop and Lieutenant Robertson is in session at the San Diego aviation school.

Capt. Thomas DeW. Milling, U. S. A., who has been for some time engaged in testing a new type of triplane at the Newport News, Va., Aviation Station, returned to Washington this week. He is understood to have reported favorably on the triplanes, which are said to exceed the biplane machines in speed, stability and dependability under fire. Because of greater strength in construction, there is much less danger of a collapse if part of a plane is shot away and, moreover, the time required in ascending is materially less than in the case of either a monoplane or biplane. As a result of Captain Milling's report, two additional machines of this type have been ordered for experimental purposes.

A "baby-speed scout" capable of flying 120 miles an hour, and two reconnoissance aeroplanes, arrived at the Army aviation school, San Diego, Cal., on January 31. The "baby scout," the fastest plane yet received at the school, has a wing spread of less than 25 feet, and it can climb 10,000 feet in ten minutes. Two pursuit triplanes, which are expected to develop a speed of 125 miles per hour are expected next week. The triplanes, the first of this type added to the equipment of the aviation school, compare favorably with the best machines now used by England, France and Germany.

Dispatches from Pensacola, Fla., state that on January 26 a seaplane attached to the Signal Corps Aviation Station was driven to an altitude of 10,500 feet, establishing a new record for that type of machine. Philip Rader was the aviator, carrying one officer with him as passenger. The machine was in the air four hours.

Personal Paragraphs

Ensign Vincent Astor, who organized the Aero Unit of the Second Batallion Naval Militia, reported promptly when the mobilization order was issued; and did patrol duty on New York Bridges.

C. B. Worthen, formerly chief engineer, Simms Magneto Co., is now inspector of aeroplanes and aeronautic engines, Aviation Section, Signal Corps, War Department.

Frederick W. Andrew, formerly engineer on production, Remy Electric Co., Anderson, Indiana, is now designing engineer, Eisemann Magneto Co., Brooklyn, N. Y.

F. L. Faurote, formerly in charge of automobile and technical advertising, H. E. Lesan Advertising Agency, Inc., New York, is now advertising manager, The Curtiss Aeroplane Co., Buffalo, N. Y.

Seeking Lost Aeroplane

An attempt to recover the military aeroplane abandoned by Lieut-Col. Harry Bishop and Lieut. W. A. Robertson, Jr., on January 10, in the Sonora, Mexico, desert, near the headwaters of the Gulf of California, will be made by sailors of the cruiser New Orleans. Col. W. A. Glassford, aviation school commandant, recommended to the War Department that this method of recovering the lost plane be adopted. The War Department approved the plan, and authorized Col. Glassford to confer with Admiral W. B. Caperton.

Yale Aero Corps Organized

The Yale Aero Corps has been organized, and the charter members are Trubee Davison, '18, of New York, president; Cord Meyer, '16 S, of New York, secretary; and A. W. Ames, '18; A. L. Gates, '18; I. A. Farwell, 3d, '18; J. M. Vorys, '18; E. C. B. Gould, '18; R. A. Lovett, '18; H. P. Davison, Jr., '20, and Professor L. P. Breckinridge.

Bailey Non-Stall Differential Corporation of Chicago, Takes Over Detroit Company

The Bailey Non-Stall Differential Corporation, 1124 Michigan avenue, Chicago, announces that it has taken over the patents and manufacturing facilities of the Gearless Differential Company of Detroit.

Plans for an extensive sales and advertising campaign have already been perfected, the unusual nature of which will shortly be announced to the trade.

The officers of the company are R. D. Small, president; George D. Bailey; vice-president; H. H. Needham (who recently announced his resignation from The Nash Motors Company), general manager and treasurer; C. F. Ferguson, secretary.

Winter spirit of the Army Aviation School at Mineola, Long Island.

Show Balloon Sold and Observation Balloon Training School to Be Established at Governor's Island

As a result of the efforts of a group of patriotic people headed by Mrs. Charles A. Van Rensselear and Mrs. Reginald de Koven, the Kite balloon which is exhibited at the Show will be purchased and a civilian training school for balloon operators will be established at Governor's Island, under the auspices of the military authorities, on the Plattsburg training camp idea.

The subscription for the war balloon was started following an address delivered by Henry Woodhouse a gathering of prominent people at the Ritz-Carlton, on February 6th, in which he discussed the pressing need of training operators for observation balloons, as there are not half a dozen all told in the United States today. Subscriptions of $250 each were made by Mrs. de Koven, James Marwich, Henry Woodhouse and Griswold Thompson. Mrs. Stuart Duncan contributed $100. The sum of $10,000 is being contributed for the purchase of the balloon and the operation of the school.

Government May Take Over Wright Patents

The Army Appropriation Bill reported by the House Committee on Military Affairs contained an appropriation of $1,000,000 for the purchase of aeronautic patents.

It is proposed that the basic aeroplane patents shall be obtained "by purchase, condemnation, donation, or otherwise." The Secretary of War and the Secretary of the Navy are to make suitable arrangements for carrying this provision into effect, and the sum of $1,000,000 is appropriated. It is understood the committee has in contemplation the acquisition of the Wright patents, although no particular patent is mentioned in the amendment.

The *Army and Navy Journal* gives an account of what led to taking this step, as follows:

"The executive committee of the Advisory Board for Aeronautics, of which Prof. William F. Durand is chairman, met on February 1 to consider ways and means of releasing the aeroplane manufacturing industry of this country from the state of stagnation into which it has been thrown through the limitations upon expansion set by the control of the Wright basic patents. The subject was put before the board at the request of the Secretaries of War and the Navy. It was stated at the meeting that, as a result of exorbitant and practically prohibitive patent royalty demands, the Government was being forced to pay prices for aviation material far in excess of those justified by manufacturing conditions, and because of the same royalty demands small manufacturers were prevented from entering the field. More than a few wealthy persons, it was said, had signified their desire to open plants for the construction of aeroplanes and aviation equipment, but had confessed hesitation to take the step, caused by the tax laid on the industry by the patent holders.

"The proposition was advanced, and was seriously discussed, of the Government entering negotiations looking to the outright purchase of the patents with a view to throwing them open to the entire people for use. Another proposal was to ask for legislation providing for the insertion in patent laws of a "compulsory license" clause which would force holders of a patent to permit its use by any applicant on the payment of a sum to be determined by the courts. There is a well-established precedent for Government purchase of a basic patent to end a monopoly. Some years ago it was found that grossly excessive prices were being charged for a patented compound known as "babbitt metal," used in bearings and other machinery parts where excessive pressure and wear were foreseen. After a vain effort to interest other manufacturers to enter the field, the Government purchased the patent outright and the "metal" now is manufactured without restriction. The result is that all needed for Navy use is secured without trouble at a normal price. Practically every European country has inserted in its patent laws a "compulsory license" clause. In England, for instance, any applicant for the right to manufacture under a patent must be granted such right, a court decree determining the payment to the patentee.

"Orville Wright, who with his brother, Wilbur, obtained the original patents on heavier-than-air machines in this country, is not now interested in those rights."

GENERAL RULES AND REGULATIONS GOVERNING THE CURTISS MARINE FLYING TROPHY, 1917

The third year's contest for the Curtiss Marine Flying Trophy is to start on January 1st and end on December 31st, 1917.

It will be remembered that the Curtiss Marine Flying Trophy, offered by Mr. Glenn H. Curtiss through the Aero Club of America, consists of a trophy valued at $5,000 and $5,000 in cash or its equivalent to be divided into five equal annual prizes.

Competition for this trophy and these prizes are to be held annually, and the conditions for winning the trophy and the yearly prize will be progressive in accordance with the progress made in water flying.

The trophy is open to competition to the members of the Aero Club of America or its affiliated Aero Clubs, who hold aviation or hydro certificates.

The winner of the trophy the third year, 1917, shall be the person, member of the Aero Club of America or of any of its affiliated Aero Clubs, who, at the expiration of the time set for the close of the third period of the contest, shall hold the record for distance covered within ten consecutive hours of one day, and which shall have been established in accordance with the rules given hereinafter. He shall receive a cash prize of $1,000 or equivalent and the club of which he is a member shall become the record holder of the trophy, which is to be held in custody by the Aero Club of America. A club becomes the owner of the trophy after the fifth year if it has been won for three consecutive years by its members.

The general rules and regulations are as follows:

Article 1. The general rules for the contest for each year are to be announced by the Aero Club of America on or before January first of each year.

Article 2. It is to be an event sanctioned by the Aero Club of America and conducted under the rules and regulations of the International Aeronautical Federation.

Article 3. The third period is to start on January 1st and close on December 31st, 1917.

Article 4. Entries must be made on this official blank which is provided by the Contest Committee. Entrance fee, $10. Entries can be made at any time. Any number of machines may be entered by the same party as separate entries.

Article 5. The entrant having complied with the requirements for entry shall be assigned a number, to be determined by the order of receipt of his entry. This number is to be borne by the aviator's machine whenever competing for this trophy on both the underpart of the lower plane and on the rudder. In case of change of machine the entrant shall add to the number a letter of the alphabet for each successive machine, beginning with letter A.

Article 6. The acceptance of entries for any trial in the Curtiss Marine Flying Trophy is discretionary with the Contest Committee and is based on the condition that the applicant, his representative or agent, is bound to accept without appeal, any decision of the Contest Committee on any matter arising from his entry, and the applicant pledges himself, his representative or agent, not to carry any matter arising out of his entry into the courts for review or adjustment. Entry fees are not returnable and go toward the expenses of the contest, except in the case of competitors declared inadmissible.

Article. 7. The contestants may start daily from any place in the United States of America or elsewhere if sanctioned by the Contest Committee, during the period of the competition, the distance covered within ten consecutive hours of one day, measured either in a straight line from starting point to a finishing point, or under the conditions hereinafter given, shall be considered as his record. Pilots are required to assure themselves of the co-operation of the officials necessary to control. Starts must be made from, and landings made upon, the water.

Article 8. The conditions governing the measurement of distances shall be as follows:

(A) *Straight line flight*: Which is a flight over water measured in a straight line from point of start to point of finish.

(B) *Broken line flight*: The competitor may fly back and forth between two points over the water, but will be penalized part of the distance, for the advantage he obtains over competitors in class (A). In this case the points must be not less than 10 miles apart. The penalization will be five per cent. of the total distance covered.

(C) *Triangular flight*: The competitor may fly over a triangular course of 30 miles over water. As in Class (B) the penalization will be five per cent. of the total distance covered.

(D) In (b) and (c) an official observer must be stationed at each turning point. In (b) the distance allowed shall be the distance between the two points multiplied by the number of complete half laps made. In (c) the distance allowed shall be the distance computed by multiplying the total number of laps around the complete triangular course, plus the distance of completed legs of the triangle.

Article 9. In crossing promontories and narrow strips of land, the aviator must always maintain a gliding angle to the water of at least one to four.

Article 10. Whenever a passenger or passengers are carried the entrants shall be entitled to the addition of five per cent. to his record for each passenger carried, and the total obtained by this addition shall determine his position for the prize. Passengers must be at least 18 years of age and each individual weigh at least 143 pounds or else brought up to this weight by ballast.

Article 11. Change of type of machine and equipment is not prohibited, but the change cannot take place to make any day's record, except in the case of flights exceeding 300 miles in distance, in which case the change of machines will be allowed so as to eliminate the waste of time of refilling the gasoline tanks, repairs, etc. As an example, an aviator flying between New York and Florida may on his arrival at any intervening city exchange his machine and continue his flight with a new machine. For such change the competitor will be penalized five per cent.

Article 12. Aviators may stop as often as they wish and make repairs, but for each and every landing, made for any cause whatsoever, the penalization will be five per cent. of the total distance covered.

Article 13. The competitor must, at least forty-eight hours before starting, notify the Contest Committee of the Aero Club of America in writing or by telegraph of his intention to start on a flight, giving the hour and place at which the start will be made. On receipt of same the Contest Committee will arrange to have representatives present. If it is impossible to secure local representatives to supervise the start, ample time must be allowed for representatives of the Contest Committee to make the journey and their expenses paid in advance by competitor to place of start and return.

Article 14. The start shall be made under the supervision of the representative who shall verify the weights of the passengers, if any, record the time of departure and submit a report covering all the facts of the departure to the Contest Committee. After landing the pilot must obtain from as many credible witnesses of the landing as possible, affidavits setting forth in full the facts of the landing with respect to its location and the exact time, forwarding these and a certificate from his passengers, if any, by mail, to the Contest Committee as soon as practicable after landing. He shall also telegraph as soon as practicable after landing to the secretary of the Aero Club of America, 297 Madison avenue, New York, giving the location and time of landing. In case there are no witnesses to the landing, affidavits from credible individuals, who saw the aeroplane after the landing, must be furnished by the pilot, these affidavits setting forth the location of the landing place and the circumstances of the landing. A topographical map of the United States Geological Survey must be forwarded with report showing turning points. The burden of proof of the accomplishment of the record rests upon the contestant and in case any doubt exists with respect to the record, or testimony of the witnesses of the landing, the performances shall be considered as null and void. The Committee reserves the right to disqualify a competitor if full and complete details of a flight are not received by the Committee within 2 weeks after the date of the flight.

Article 15. A record shall be considered bettered when the official measurement shall show that the distance exceeds the previous record by at least five miles.

Article 16. Hydroaeroplanes and flying boats must carry at all times, ready for use, regulation motor boat signal lights, compass, anchor and rope, and one life preserver for each passenger. Towing is not prohibited, but distance must be stated in report. Official representative must state that above regulation has been observed.

Article 17. A competitor, by entering, thereby agrees that he is bound by the regulations herein contained or to be hereafter issued in connection with this event.

Article 18. The interpretation of these regulations or of any to be hereafter issued shall rest entirely with the Contest Committee of the Aero Club of America.

Article 19. The competitor shall be solely responsible to the officials for the due observance of these regulations, and shall be the person with whom the officials will deal in respect thereof, or of any other question arising out of this event.

Article 20. Protests will not be entertained unless presented in writing accompanied by the sum of ten dollars which will be returned only if the validity of the protest is recognized.

Article 21. Points not covered by these articles shall be subject to the rules and regulations of the International Aeronautic Federation, and such special rulings as may be made from time to time by the Contest Committee.

Article 22. The Contest Committee will notify only actual entrants of any changes in or additions to the present rules and regulations.

Entry blanks can be obtained from the Secretary of the Aero Club of America, 297 Madison avenue, New York City.

Class of Army students at the Curtiss training field, Miami, Florida.

PRESIDENT WILSON OPENS EXPOSITION BY WIRELESS AND GOVERNOR WHITMAN AND DIRECTOR-GENERAL BARRETT WITH HEARTY ADDRESSES

PRESIDENT WILSON opened the Exposition by wireless and Governor Whitman and John Barrett with hearty addresses—and an immense crowd thronged in the Grand Central Palace to participate in what was properly called the "Opening of the Age of Wings."

Thanks to special arrangements made with the *New York Herald,* and by William Dubullier, the radio expert, President Wilson's wireless message, which was sent from the Government's radio station at Arlington, was received by the receiving radio set installed in an aeroplane at the Exposition. Only the present national crisis prevented the President and the other high officials from being present in person.

But hundreds of diplomats, representing different countries, and men of national prominence, and state and city officials, were present when Governor Whitman, escorted by his staff and officials of the Aero Club of America, and Pan-American Aeronautic Federation arrived.

And they were all enthusiastic—they had reasons to be! No one, excepting, perhaps, the men of vision who conceived the idea of this remarkable Exposition, had any idea that it would be such a wonderful event.

The aerial limousine made a hit—so did many other exhibits.

Close to 30,000 Tickets Sold to Public

Thanks to the able management of Messrs. Howard E. Coffin, Henry Woodhouse, Augustus Post, Richard Hollerman and G. Douglas Wardrop, who have worked indefatigably for the past four months to make the Show the great success which it is, close to 30,000 tickets have been sold to the public at date of writing, and a record will undoubtedly be made in attendance.

Aero is Radio Call for Exposition

A-E-R-O is the official radio call for the Exposition. That call is already known all over the world, the wireless operators having delighted in radiating, most appropriately, the reports of the opening of the Exposition.

The Convention Hall on the third floor is a most popular place. The addresses delivered there are most exceptional and thousands avail themselves of the opportunity afforded. AERIAL AGE is going to print the addresses in future numbers.

The Show is everything that has been claimed by the organizers—and more.

GOVERNOR WHITMAN CORDIALLY ENDORSES AERO CLUB OF AMERICA'S WORK

Excerpts from Address at Formal Opening of the Exposition

NOT only as Governor of the State, but as an American citizen vitally interested in all that concerns the safety and well-being of the United States, I am pleased and proud to speak the few formal words that are to open the first Pan-American Aeronautics Exposition.

It is an undertaking that presents aspects as tremendous as they are inspiring, for in the complete **and assured conquest of the air,** that is your aim, may yet come to lie the hope of a land, the liberty of a people and the persistance of free institutions. . . . What measure of preparedness we now possess is due in small degree to the compulsion of the majority, but rather to the determined insistence of a minority. **And not the least of the forces that have fought for the wise thing, reading the future with clearer vision than their fellows, has been the Aero Club of America. Its task has not been easy, for of my knowledge I know that its progress has been blocked by every misunderstanding, but never at any time has there been a hint of discouragement; any cessation of dynamic effort. And if no other result has been achieved, the existence of the Aero Club would be justified by this exposition that now gathers and directs not only the aeronautical genius of the United States but of our sister Republics.**

Few words have a finer, more inspiring sound to me than Pan-American. By virtue of the liberty that is our common hope, the nations of the Americas have a kinship of the spirit that grapples even more closely than any kinship of blood. Even as the souls within us have given us the same aspiration, so does geographical arrangement give us the same destiny. Distrusts and suspicions, engendered by ancient misunderstandings, and ancient wrongs, perhaps, have been permitted to work an unfortunate estrangement, but today, as never before, I believe, there is friendship and faith between North America and the republics of Central and South America. May their inclusion in this Exposition symbolize their inclusion in brotherhood—may the Pan-American that gives this gathering a name stand for an alliance that will face the world as one, neither North America, nor South America nor Central America but AMERICA.

I may not cease without reference to the crisis that the nation faces. If it is to be war, then never did a people take the field with consciences so clear. There is no effort or sacrifice that we have not made in the sacred cause of peace, and at no time have our demands been based on other than fundamental principles of right, of justice and of humanity.

And if war comes, let no man doubt that the manhood of America will surge to the same tremendous courage that marked the heroic battle grounds of the Revolution, the bloody fields of the Civil War. It is not courage that we need to worry about, but a rarer, even finer quality—self restraint.

It is to be remembered that Germany, from time immemorial, has sent us men and women who have builded themselves into the very structure of the nation and that these sons of our adoption proved their patriotism from Manassas to Appomattox. I do not doubt that in the great moment of decision they will give loyalty to America as unwavering as that of those who are descended from the Pilgrim Fathers.

What we have got to do is to believe it. He who denies it without good ground, or who, under the grimy banner of a false and distorted patriotism, starts a campaign of race hatred, seeking to set fire to the inflammable passions of the mob, is not only a traitor to America, but an assassin of Humanity.

THE PAN-AMERICAN OPPORTUNITY

Address Delivered by Hon. John Barrett, Director-General Pan-American Union, at Formal Opening of Aeronautic Exposition

I CONGRATULATE the planners and managers of this Exposition upon its timeliness. There has been no time before in the history of the American nations when Pan-Americanism means as much as it does at this very hour. Pan-America and Pan-Americanism stand for a group of nations and for a principle of co-operation that should make the constituent countries, acting together, the leaders in world civilization and world progress.

Pan-America politically means the twenty-one independent republics of the New World, reaching from the United States, Mexico and Cuba on the north to Argentina and Chile on the far south. Pan-America means a united area of 12,000,000 of square miles, which is equal to three times that of Europe, almost the whole of Africa, and two-thirds that of Asia. If Pan-America politically included Canada, as we hope it may some day, either directly or indirectly, then the whole Western Hemisphere would come under that comprehensive term. Pan-America also means an annual foreign commerce with the nations of the Old World amounting to nearly ten billions of dollars, a figure almost beyond easy imagination. But it is on the human interest side that Pan-America means the most, because it comprehends nearly two hundred millions of souls, of which nearly eighty millions are in our sister American republics.

The vast present and future meaning of Pan-Americanism is realized when we bear in mind that its simplest interpretation is that of the hearty and sympathetic co-operation of these nations, these people, these areas, and this commerce for the common good of all.

There is nothing more gratifying to-day than the growth of interest throughout the United States in the twenty Latin-American republics, and of their corresponding desire to know more of the United States. Surely a new era in Pan-American relations has dawned in the last few years, and it looks now as if a brilliant and long day of achievement were ahead.

The average of trade exchanged between the United States and Latin America for the three years before the war was seven hundred fifty million dollars; during this past year it has grown to the extraordinary figure of one billion two hundred million dollars, an increase of nearly five hundred million dollars. The problem is now, therefore, directly up to the great financial and business interests of the United States and of Latin America as to whether this increase shall be continued and made still larger when the present war has ended and the days of peace have come.

Under these conditions it is indeed most fitting that there should be held the First Pan-American Aeronautic Exposition. The opportunity for aerial navigation throughout all Latin America is extraordinary, and it can undoubtedly have more influence upon the development of the Latin American countries than it can even upon the United States. The conformation of nearly every country of the twenty lying south of the United States is such as to make unusual demands upon the use of the auto engine, whether it be for the machine that flies or for that which goes upon the ground. The mighty mountain ranges of the Sierras and Andes which reach all the way from northern Mexico south to southern Chile make railroad building most difficult and expensive. The problem of adequate transportation throughout this reach of six or seven thousand miles can only be solved by the use of automobiles upon winding roads built up the mountains and by aeroplanes navigating easily the air. Then again in the great tropical valleys of the Amazon, the Orinoco, the Upper Parana and the Magdalena it will be far easier to build automobile roads and provide landing spaces for airplanes that it will be to construct actual railways.

The more one studies the opportunities for the aeroplane or any kind of carrier machine operating in the air, the more enthusiastic he becomes. No man who has traveled over Latin America can fail to experience a thrill as he thinks of going rapidly from, say, Cartagena on the Caribbean Coast, or Barranquilla on the Pacific Coast of Colombia, to Bogota, its capital, located in the mountain fastnesses, in the course of a few hours by aeroplane, where now it takes anywhere from five to ten days by boat and railway. Again imagine one starting from Guayaquil to go up to Quito, and instead of a two days' ride and a night stop, climbing lofty mountains with all kinds of possible delays and accidents, one makes the trip through the air likewise in a few hours. This same picture could also be made to apply to La Paz, the capital of Bolivia, Caracas, the capital of Venezuela; San Jose, the capital of Costa Rica; Tegucigalpa, the capital of Honduras, and numerous other capitals and centers of Latin America. Then again, imagine the potentialities of the aeroplane in the great valley of the Amazon. In place of the long, tedious trip up the river by slow steamers, one will be able to go from Para to Manaos, a thousand miles, and again from Manaos to Iquitos, another thousand miles, in two days, where by steamer it would take two weeks. And so I might go on giving numerous illustrations to prove my argument, but these are sufficient to awaken the interest of governments and peoples, advocates and manufacturers of all kinds of machines and carriers for navigating the air.

In conclusion, however, the point beyond all others that I wish as a Pan-American to emphasize is that the development of aeronautics can become, and is sure to become, one of the most powerful and practical influences for developing real Pan-Americanism; that is, the actual, achieving, progressive, sympathetic co-operation of all America for the good of each and every land. There are no stronger influences for binding countries together than the best conditions of communication and travel. Mutual acquaintance of a close kind leads to mutual trust; mutual confidence begets mutual commerce; mutual trade fathers treaties for mutual welfare, and hence we must welcome the new era of the air carrier for passengers, for mails, and possibly for express and freight, which will solve the difficulties of distance, of mountains, of jungles, of climate, which now confront the advocates of the cause of Pan-Americanism. Let us, therefore, do all in our power, whether we come from North or South America, to help forward the aeronautic era, and thereby promote practically the cause of Pan-Americanism. In this effort I pledge you such co-operation as can consistently be given you by the Pan-American Union, the official international organization of all the American republics, dedicated to the promotion of friendship, good understanding, commerce and peace among all the American nations, while I, in my humble responsibilities as its executive officer, will always be ready to await your commands.

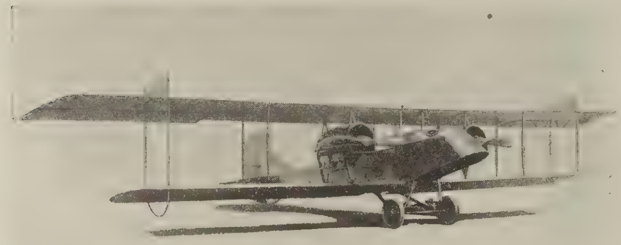
AMERICAN AEROPLANES

Aeromarine Plane and Motor Company, New York City

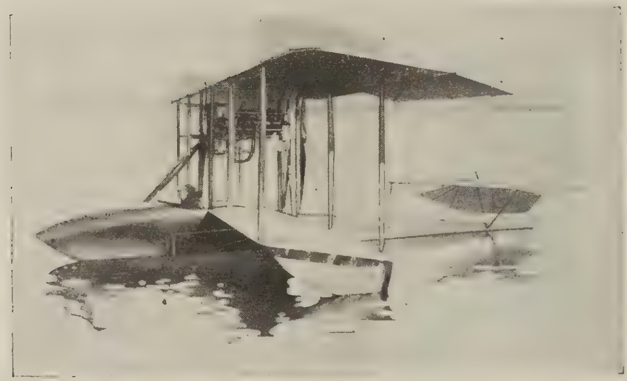
The Aeromarine Type 700 Tractor Seaplane is of the twin float type and is powered with an Aeromarine motor of 90 h.p. giving it a speed range of 45 to 65 m.p.h. Its weight is 1,800 lbs. Its climbing speed with full load is two hundred feet per minute. It can carry a useful load of 700 lbs. Its range of flight, fully loaded, is 3½ hours.

Andermat Aeroplane Company

The Andermat tractor biplane equipped with two 125 h.p. Hall Scott motors was flown successfully last year and it is stated that a New York organization is now laying plans for the production in quantity of this machine with a factory somewhere in the West.



Curtiss Model Twin JN military tractor.



Curtiss Model F flying boat.

Atlantic Aircraft Company

The Atlantic Aircraft Company, which recently dissolved, produced a twin motored tractor biplane equipped with two 6-cylinder Aeromarine engines. During the tests of the machine at Mineola it showed excellent climbing ability and was sustained successfully by one motor. The machine was designed by Mr. A. S. Heinrich.

Benoist Aeroplane Co., Sandusky, Ohio. Manufacturers of Aeroplanes and Flying Boats

Tom W. Benoist, the pioneer aviator, has on exhibition one of his well-known Benoist flying boats, equipped with Roberts motor.

Barnhardt Aeroplane Company

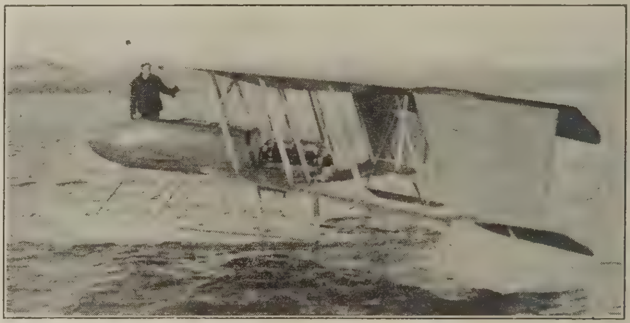
This company is the nucleus of an organization which may be expected to build the Barnhardt tractor in quantity during the next year. It is a machine with 34 feet wing spread, equipped with a Curtiss 100 h.p. motor and has good flying qualities.

The Bates Aeroplane Company

With a factory located in Chicago and with a tractor biplane which promises to be attractive to exhibition flyers, the Bates Aeroplane Company is in good shape for this kind of business during the next season. The company is also making a number of experiments with two aeronautical engines which they hope to announce to the industry in the very near future.

The Burgess Co., Marblehead, Mass.

The Burgess Type "U" Seaplane is of the float type, and weighs 1,799 lbs. Powered with a Curtiss motor of 100 h.p., it has a speed range of 40 to 69 m.p.h. Being of light, sturdy construction and possessing a wide speed range, it fills a very pressing need for training machines. A pair of these are in use by the Massachusetts Naval Militia.



Burgess-Dunne Seaplane Model U.

The Bugress-Dunne Seaplane is an inherently stable pusher machine, possessing no rudder or tail flaps. It is also of the 1 main float type, and equipped with a Curtiss motor of 90 h.p., has a speed range of 45 to 70 m.p.h. It is manufactured by the Burgess Company under the Dunne patents.

The Burgess-Dunne Flying Boat is designed principally for sportsmen. Crew and passengers are seated in a seaworthy hull provided with wind and spray shields, deep cushions and all the appurtenances of a modern high-speed launch.

Cooper Aeroplane Company

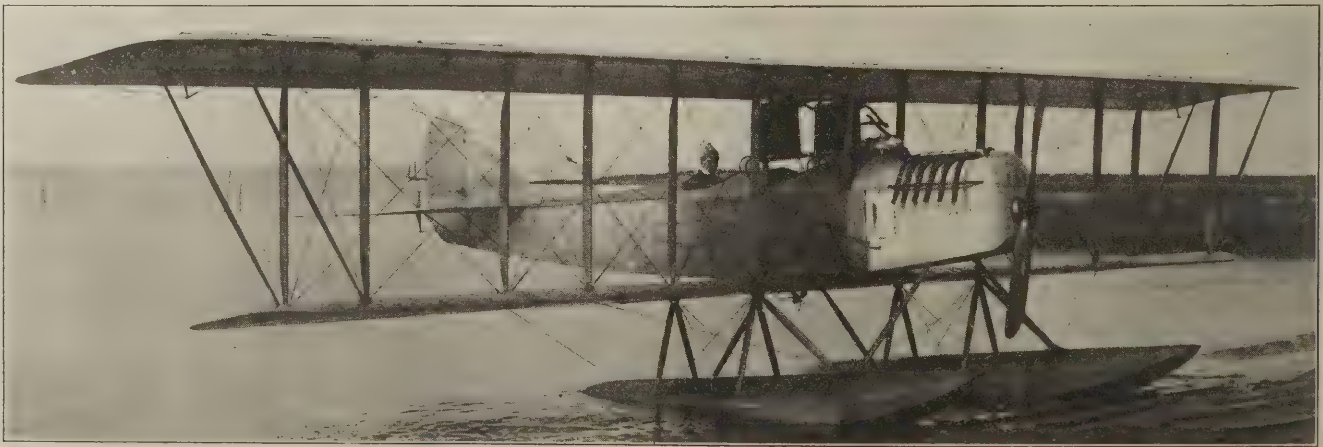
Mr. John D. Cooper, one of the pioneers in the aeroplane industry, shows for the first time at the exhibition a remarkably interesting small machine which ought to have wide appeal amongst sportsmen. It is equipped with a rotorary motor and has a wing spread of 24 feet.

Chicago Aero Works

Another interesting machine is the Stupar tractor, illustrated, produced by the Chicago Aero Works, Chicago, Illinois. The machine reproduced herewith was constructed for W. A. Christensen and is similar to the type used by Earl L. Daugherty.

Christofferson Aeroplane Corporation

With a large plant at Redwood and excellent facilities for flying, the Christofferson Company is in good shape for the production of aeroplanes and for the tuition of a large number of pupils. The machine is of the tractor type and is equipped with a Christofferson motor.



The Aeromarine "700" which, until ice prevented, was flown at Keyport, N. J., by Aviator Clarence A. de Giers.

Curtiss Aeroplane Company, Buffalo, N. Y.

The Curtiss Twin-Motored Tractor is equipped with two Curtiss motors of 90 h.p. each suported between the planes by heavy struts on either side of the central fuselage. The fuselage projects well forward of the leading edges of the planes, giving an unrestricted view to the observer, The machine illustrated is the one in which President Hawley, of the Aero Club of America, flew to Washington, piloted by Victor Carlstrom.

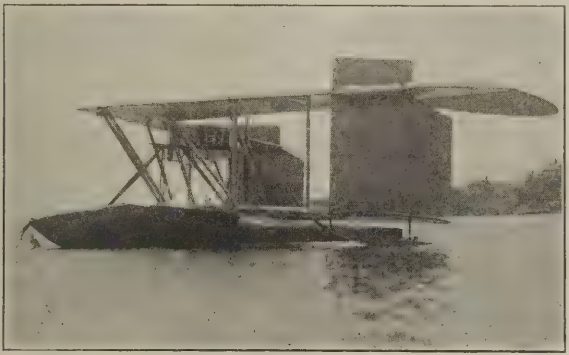
Equipping the machine with pontoons, Victor Carlstrom won the Curtiss Marine Trophy for the year 1916.

CURTISS MODEL JN4-B—MILITARY TRACTOR

General Dimensions: Wing span, upper plane, 43 ft. 7⅜ in.; wing span, lower plane, 33 ft. 11¼ in.; depth of wing chord, 59½ in.; gap between wings, 62$\frac{3}{16}$ in.; stagger, 12$\frac{5}{16}$ in.; overall length of machine, 27 ft. 3 in.; overall height of machine, 9 ft. 10½ in.; angle of incidence, 2½ degrees; dihedral angle, 1 degree; sweepback, 0 degrees; wing curve, Eiffel No. 36; horizontal stabilizer, angle of incidence, 0 degrees.

Areas: Wings, upper, 172.15 sq. ft.; wings, lower, 152.26 sq. ft.; ailerons (each 17.64 sq. ft.), 35.28 sq. ft.; horizontal stabilizer, 28.70 sq. ft.; vertical stabilizer, 3.80 sq. ft.; elevators (each 11.00 sq. ft.), 22.00 sq. ft.; rudder, 12.00 sq. ft.; total supporting surface, 359.69 sq. ft.; loading (weight carried per sq. ft. of supporting surface), 5.30 lbs.; loading (per b.h.p.), 21.16 lbs.

Weights: Net weight, machinery empty, 1,320 lbs.; gross weight, machine and load, 1,905 lbs.; useful load (fuel, 225 lbs.; oil, 30 lbs.; pilot, 165 lbs.; passenger or other load, 165 lbs.), total, 585 lbs.



Burgess-Dunne Flying Boat.

CURTISS MODEL F

The Curtiss Model F Flying Boat is of the boat hull type, equipped with a Curtiss 90 h.p. motor driving a pusher propeller, which gives it a speed range of 45 to 65 m.p.h. Its gross weight, with a useful load of 660 lbs., is 2,100 lbs.

The Curtiss Model N-9 is the Curtiss Twin Motored Tractor, with twin floats substituted for wheels.

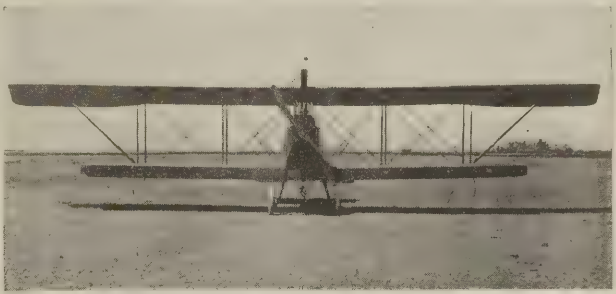
The Curtiss R-4 Military Tractor has a V two-wheel landing chassis and is powered by a Curtiss Motor of 200 h.p. Its gross weight, including a useful load of 1,020 lbs., is 3,245 lbs. It has a stagger of 10¾ inches, and a dihedral angle of 3 degrees.

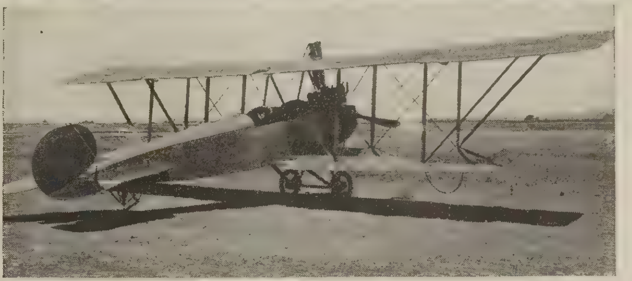
Gallaudet Aircraft Corp., Norwich, Conn.

The Gallaudet Seaplane combines the advantages of the pusher type, with those of the tractor in that the pilot's and observer's views are unrestricted in all directions, the case with all pusher types, yet the seaplane possesses a fuselage, greatly lessening resistance. The machine is equipped with two Dusenberg engines of 150 h.p. each, driving two propellers. The part of the propellers nearest the center which absorbs power without producing any propulsive effort is inside the body so that the power usually lost in this portion is expended near the tips. The result is an increase in efficiency. The machine has a flying radius of 4 hours at 100 m.p.h. two engines running, or 11½ hours at 70 m.p.h. one engine running.

General Aeroplane Company, Detroit, Mich.

The "Verville" Type has a two wheel, with skids, landing chassis which can be removed and pontoons substituted for us as a seaplane. It is equipped with a Curtiss motor of 100 h.p. and has a speed range of 46 to 84 m.p.h. It has a flying range of 6 hours at full speed, fully equipped. The nacelle protrudes quite far in front, giving the pilot and passenger a greater range of vision than is ordinarily the case.

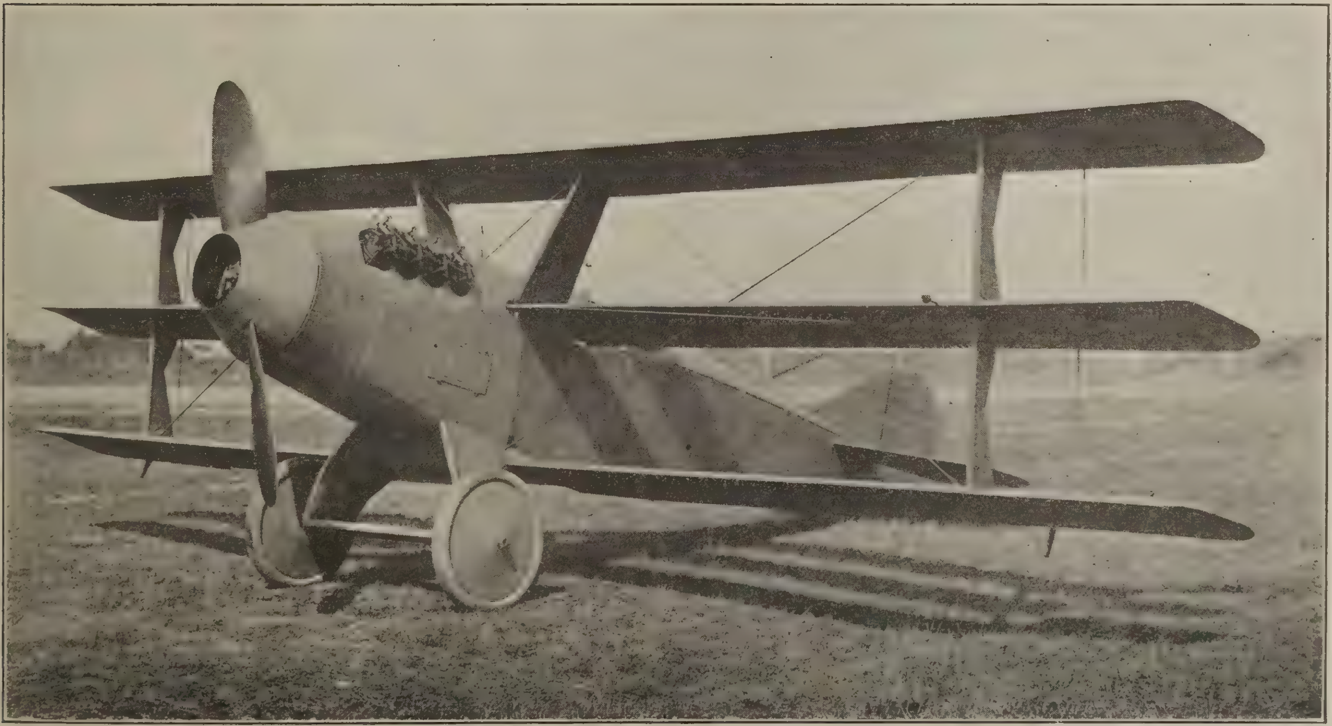




Wright-Martin Model R.

Kyle Smith Aircraft Company

With a six-cylinder radial engine and the machine weighing only 600 lbs. the Kyle Smith tractor should be a speedly little craft for sportsmen who want to take up land flying. The factory facilities at Wheeling, W. Va., will enable this company to establish itself very thoroughly during the next year.



Curtiss triplane equipped with 160 h.p. motors.

Sturtevant Model S seaplane.

Sturtevant seaplane.

Sturtevant seaplane used by Rhode Island Militia.

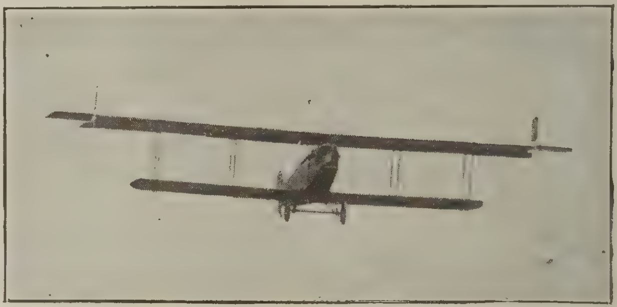
The Benoist tractor biplane with fuselage of steel construction.

Laird Aviation Company

Emil Laird, head of the Laird Aviation Company is well known in the West as an exhibition flyer and the popularity surrounding his exhibition work has created considerable interest in the West in the Laird Tractor Biplane. The machine has a wing spread of 26 feet and is equipped with a 24 h.p. Anzani engine.

The Lanzius Aircraft Company

This company controls the Lanzius Aircraft patents and are commercializing a machine the general characteristic of which is its changeable angle of incidence. It is stated that this angle can be changed from 0 degrees to 15 degrees. According to present plans Duesenberg engines will be used.

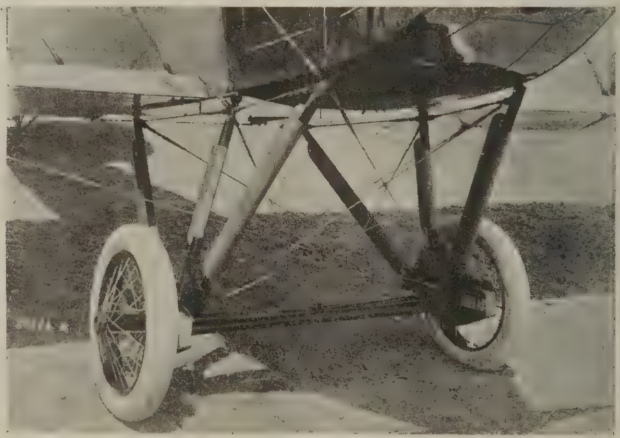


Curtiss military tractor equipped with Martin aerodynamic stabilizer.

L. W. F. Model V Tractor Biplane

The machine illustrated is the product of the L. W. F. Engineering Co., and is equipped with a Thomas 135 H.P. Aeromotor. One of the chief features of this machine is the manner in which the fuselage is constructed. Three plies of extra selected wood are used, and between each ply is a layer of silk which has been chemically treated, so that when the cement is applied, the laminations are thoroughly bound together.

The machine has been used quite often in the neighborhood of New York.



Landing chassis of the Wright-Martin Model R.

Lawrence-Lewis Aeroplane Company, Chicago, Ill.

The Lawrence Aeroplane is the invention of George R. Lawrence, of Chicago. The development of this machine has extended over a period of several years. Numerous experiments and tests have been made.

The company was only recently organized to take over the patents and manufacture the machine.

During the summer of 1915, a full-sized experimental machine was built (Model A-1). This machine was shipped to Florida in January, 1916, and an experimental camp established in the jungle on the shores of Old Tampa Bay, about six and one-half miles from Tampa, and almost inaccessible to curiosity seekers. During the three months which followed, many flights were made and valuable information gained.

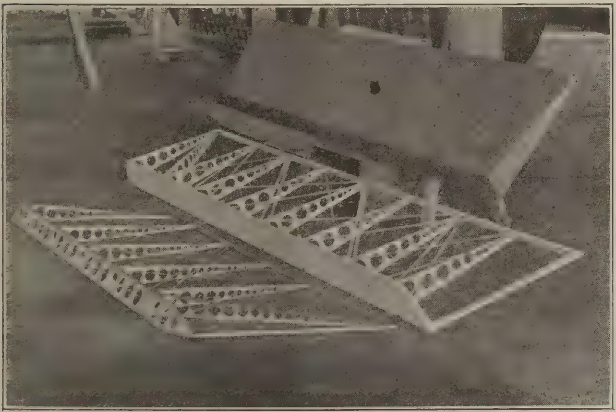
About the middle of April, when the weather in the North became favorable for flying, the entire outfit was moved back to Chicago. An experimental camp was established outside of the city, and for three months the machine was in the air almost daily. The 150 or more flights were made without any means of controlling laterally other than those inherent in the machine. Neither wing-warp nor ailerons were employed. A model C4 Kirkham motor was used.

The Aeromarine Plane & Motor Company's seaplane.

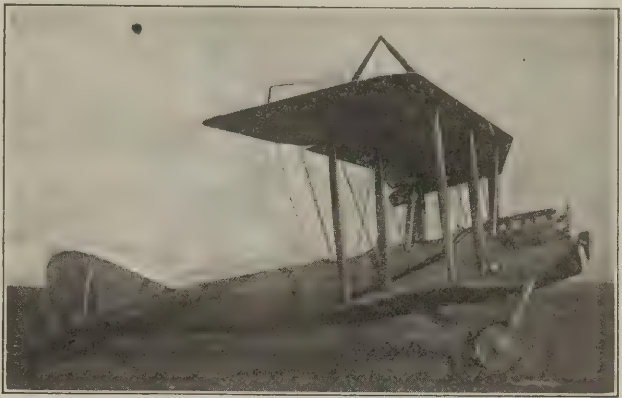
The machine experienced no difficulty in leaving the water and flying with a useful load of over 700 lbs., consisting of two hours' fuel supply, pilot (160 lbs.), passenger (185 lbs.), and 350 lbs. additional load put into the machine for the purpose of determining its lifting power.

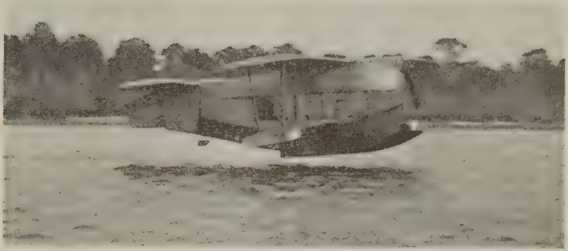
The noticeable features of these flights were the entire absence of lateral disturbance and unsteadiness, the speed and ease with which it could leave the water, its natural and correct banking, and the entire absence of "porpoising" when getting away or landing. Not once did the machine, after leaving the water, touch it again until it came down for landing, and in no instance after touching the water after making a landing, did it "porpoise" or skip. A stop-watch test showed a getaway from a standing start in less than five seconds; the machine had left the water and was in the air within that length of time.

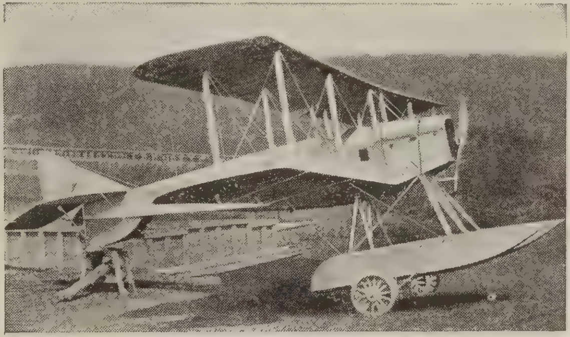
It is a tractor biplane. It is a combination land-and-water machine and so constructed as to permit of arising from and alighting on either land, water, snow or ice. When used as a land machine, the landing chassis disappears into the fuselage immediately the machine gets into the air, thereby doing away with a very considerable amount of drag. The Lawrence machine in many respects is a radical departure from standard practice in aeroplane manufacturing. While the photographs bring out this point to a large extent, the real significance of these changes can be grasped only by a comparison of the constructional details with those of other machines.


Detail of the construction of the Sturtevant aeroplane.

Safety is the cardinal feature of this machine. It is inherently stable and non-capsizable. Its low aspect ratio and compact construction give an increased factor of safety with considerable reduction in weight, this being accomplished without sacrifice of efficiency, but rather the reverse, as evidenced by the high lift-drift ratio (11 to 1). The wide speed range, which permits of starting and landing at a very low speed, is also an important factor of safety. There are two independent systems of control. It is only necessary for the pilot to manipulate his elevator and rudder, which with the Lawrence two-in-one

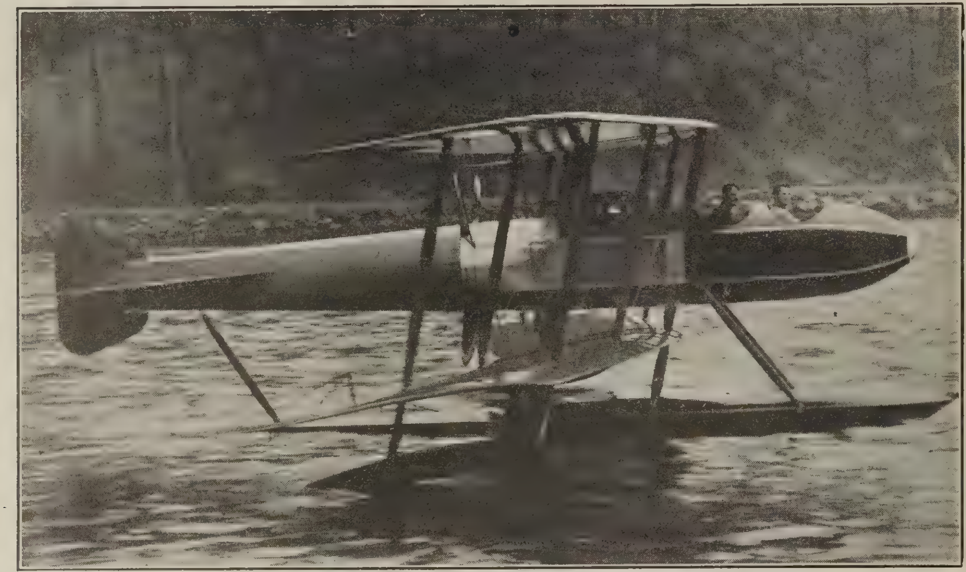

L. W. F. tractor biplane equipped with Thomas motor.


Lawrence-Lewis Model A-1 landing at Tampa, Florida, 1916.


Thomas seaplane.

Curtiss flying boat Model F.

United Eastern Aeroplane Company's military tractor.



Gallaudet twin motored seaplane constructed for the U. S. Navy.

control is extremely simple. The absence of the constantly used body-yoke or lever for the operations of airlerons, cuts out the most trying and wearing feature of a pilot's work. This feature will appeal especially to the beginner or the private owner or sportsman who undertakes to learn to pilot his own machine, which with the Lawrence machine he can readily do. The natural and correct banking qualities of this machine are particularly advantageous in the handling of battle-planes or other war machines in the matter of quick maneuvers.

The fuselage is very roomy and entirely enclosed, and pilot and passengers are saved all of the rigors, hardships and inconveniences caused by the elements or the propeller blast, and this is particularly true in connection with long distance and altitude flights—more especially in winter time. The enclosed fuselage also makes unnecessary goggles, helmets, cumbersome clothing, etc. The enclosed fuselage adds to the comfort of the pilot and passengers in the same, or even greater degree, that the limousine does for the automobile.

Seats for passengers are so arranged as to leave an aisle through the center of the car, which makes it possible for a passenger to move about without disturbing the balance of the machine or inconveniencing the pilot; this feature also makes possible easy access to all parts of the motor.

The Martin Aerodynamic Stabilizer

The manner in which the Martin Aerodynamic Stabilizer is used on aeroplanes is shown in the accompanying photograph. Good results have been achieved with aeroplanes equipped with this apparatus and although its appearance would seem to suggest weight it is light and strong, non-corrosible aerometal being used in the construction.

M. F. P. Sales Corporation

With Walter H. Phipps as their designing engineer the M. F. P. Sales Corporation, a subsidiary company of the Polson Iron Works, Toronto, Canada, started the manufacture of aeroplanes last year. A special feature was the utilizing of steel tubing in the construction of the machine and in the present expected state of activities in Canada this machine will probably be produced in considerable quantities. The power plant consists of a Hall-Scott Motor.

New York Aero Construction Company

Warren S. Eaton, the designer of the twin-motored hydroaeroplane manufactured by the New York Aero Construction Company is a pioneer and has followed, or rather has been in advance, of the vast developments in the aeroplane field in this country.

His last production is a mighty interesting machine and when the Company gets on a large production basis should be heard from to real effect. This machine has a spread of 73 feet with 820 feet of supporting surface and fully loaded will weigh 4,500 lbs.

Pacific Aero Products Corporation

The Pacific Aero Products Corporation is the direct result of the spirit of patriotism which pervades the aeroplane company of the Northwest of which W. E. Boeing is president. The first machine produced is of the double pontoon hydroaeroplane type and has already been successfully flown in the neighborhood of Seattle. A Hall Scott engine is used.

S. S. Pierce Aeroplane Corporation

Anticipating the day when owners of fast speed boats and racing automobiles will turn to the aeroplane for their recreation the S. S. Pierce Aeroplane Corporation have produced a small machine equipped with three-cylinder 40 H. P. motor designed by Charles L. Lawrence. The machine is especially designed for slow speed and general flying efficiency and safety.

Mr. Pierce has had a vast amount of experience in this country and in Europe.

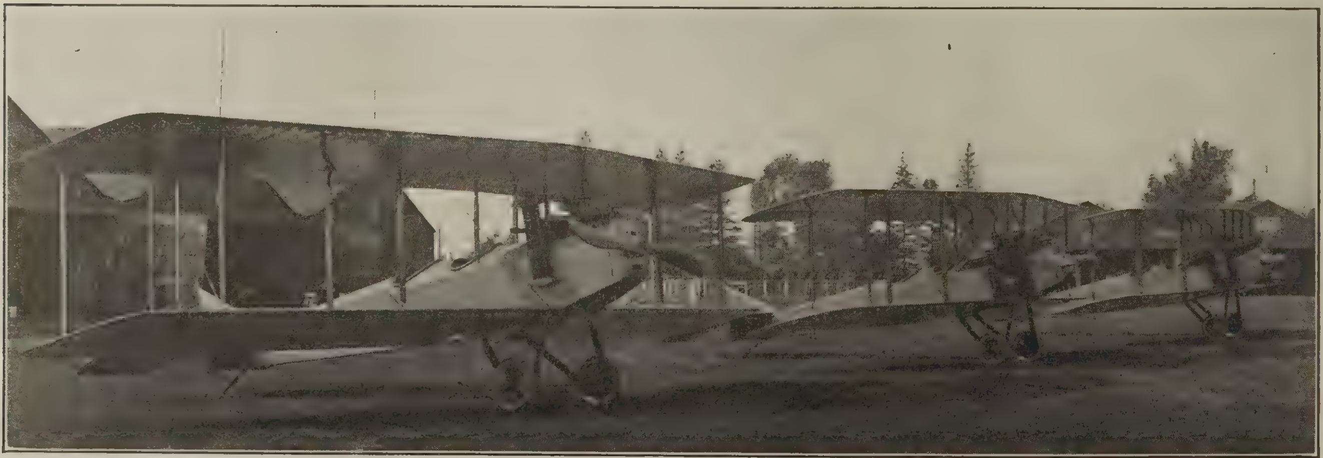
Shaw Aeroplane Company

The Shaw monoplane is familiar to exhibition flyers in the West and with the renewal of interest in this type of machine it is possible that this company will have renewed activity during the next summer.

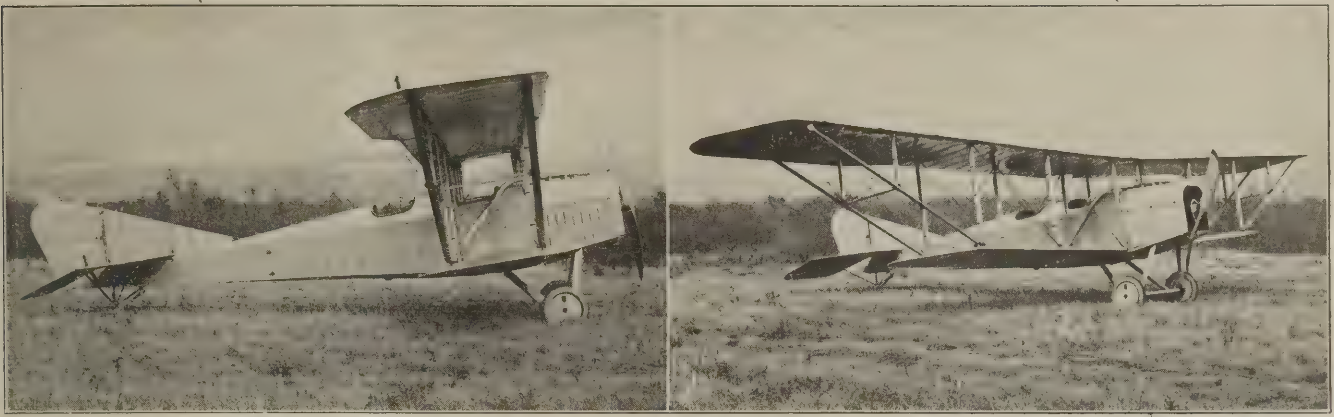
The Standard Aeroplane Company

The three machines shown in the accompanying illustration are the product of the Standard Aero Corporation and represent the type constructed for the War Department. Three of the "H. 3" tractors were delivered to the Aero Squadron at the training camp at Mineola, L. I., where they were in daily use for instruction purposes. The swept back wings adds to the streamline appearance of the machine.

The power plant consists of a Hall-Scott A 5 135 h.p. motor having 6 vertical cylinders.



Three Standard tractors at the Mineola Flying Field, Long Island.



Two views of the Thomas D-2 military tractor being constructed for the Army.

The Sturtevant Tractor Biplane

Steel constitutes a large portion of the material used in the Sturtevant Model S Tractor Biplane, shown in the acompanying photograph, making it rather difficult for moisture and variation of temperature to injure the control surfaces. An idea of the manner in which the steel is used may be obtained from the small photograph. The power plant consists of a 140 h.p. Sturtevant motor.

During the past year machines of this type were ordered by the Army and Navy Departments.

Thomas-Morse Aircraft Corp., Ithaca, N. Y.

The Thomas D-5 reconnaisance type was designed especially for military purposes, combining unusual strength of construction, without sacrifice of stability or controlability. It is of the two-wheel type without skids and is equipped with a Thomas engine of 134 h.p., giving it a sped range of 48 to 86 m.p.h.

The Thomas seaplane is of the two main floats type, flies at 82 m.p.h. fully loaded, climbs 2,700 feet in 10 minutes and has a gliding angle of 1 to 11. It is equipped with a Thomas motor of 135 h.p. This machine was the first of its kind accepted by the U. S. Navy after exhaustive tests. The Thomas Company also manufactures other models, including twin motored types.

U. S. Navy Hydroaeroplane

The hydroaeroplane shown in the illustration is the product of the Aviation Section of the U. S. Navy and was constructed under the direction of Naval Constructor H. C. Richardson. The power plant consists of two powerful motors, and from all appearances the craft was designed to stand up well under severe conditions.

The United Eastern Military Tractor

One of the new additions to the large flock of machines at Garden City, Long Island, is the United Eastern Military Tractor, reproduced herewith. This machine was designed and constructed under the supervision of Mr. Edward F. Marshonet, and the aviator responsible for its good results, is Mr. Frederick C. Hild.

A 120 h.p. 8-cylinder Maximotor constitues the power plant. The machine is used for school purposes, the control system being of the Deperdussin type.

Wittemann-Lewis Aircraft Company

The Wittemann Brothers have experimented for a number of years on various types of wing surfaces at their laboratory at Staten Island, and they have now formed the Wittemann-Lewis Aircraft Company with a view to commercializing the data gained by their experiments. They have secured a plant at Newark, N. J., and in the very near future the two place reconnaissance tractor will be tested in the air and the tests are being looked forward to by aeronautical experts with a tremendous amount of interest.

Wright-Martin Aircraft Corp., New York City

The Wright-Martin Model V is a two place tractor biplane, designed for long-range military reconnaisance, with the observer's cockpit well forward of the entering edge of the lower wings. The power plant consists of a Simplex Model A Hispano-Suiza eight-cylinder, water-cooled engine. The wings are staggered and have a slight dihedral angle. The machine is of the two-wheel type with no skids (except, of course, a tail skid). The weight of the complete machine, including pilot (165 lbs.) and passenger (165 lbs.), luggage, parts, supplies, etc., and gasoline and oil for six hours flight at full power, is 2,630 lbs.

The Wright Model H. S. Pusher is of the two-wheel, without skids, type, equipped with a Wright 60 h.p. engine driving two propellers by chains. It has a speed range of 42 to 76 m.p.h.

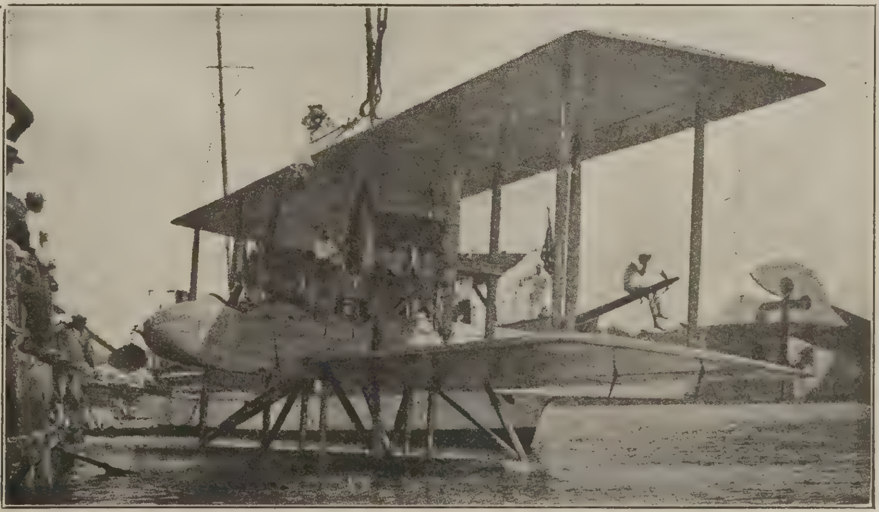
The Wright-Martin Model R is a tractor biplane, equipped with a Hall-Scott 125 h.p. motor, giving it a speed range of 46 to 86 m.p.h. It was designed for reconnaisance work and general sport use. It has climbed 4,050 feet in ten minutes. Carrying pilot and passenger and 140 lbs. of luggage it can make a non-stop flight of 425 miles.

Thomas D5 Military Tractor

The machine shown in the illustration represents a splendid example of staunch construction. The power plant consists of a Thomas 135 h.p. motor, the method of exhaust from the motor comprising a unique and interesting feature in that it adds to the comfort of both passenger and pilot. Another interesting feature is the manner in which the hood over he engine is secured. This is done by snap catches and locked by a key afterwards as double security, thus adding to the neatness of construction and the possibility of removing the hood covers at short notice.

As all Thomas motors are equipped with self-starters, the necessity of cranking by means of the propeller is eliminated.

Twin-motor hydroaeroplane constructed by the U. S. Navy.



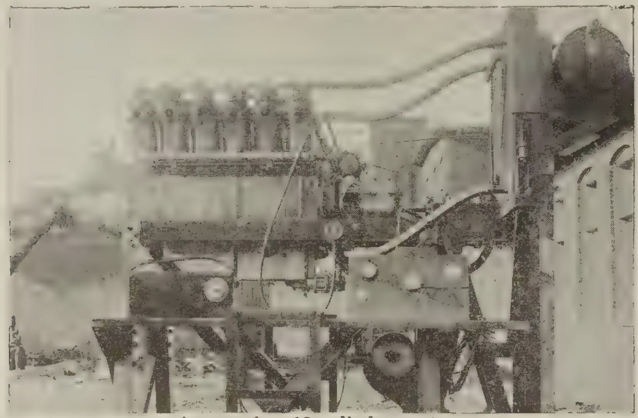
AMERICAN AERO ENGINES

Aeromarine

The type A. G. 6 is a six-cylinder vertical motor delivery 100 H.P. at 1400 r.p.m. Bore 4 5/16"; stroke 5⅛".

Cylinders cast individually with copper jackets electrolytically deposited. Valves concentric and in head of cylinder. Intake within exhaust valve, and mechanically operated by rockets and push rods, from cam-shaft in usual position in crank-case. Seven bearing crankshaft. Two Zenith carburetors. Two Bosch magnetos and two spark plugs to each cylinder. Weight 435 lbs. complete, without radiator. Gasoline consumption 0.63 lbs. per H.P. per hr. Oil consumption 0.063 lbs. per H.P. per hr. Width overall 30". Height overall 36¾". Length overall 58".

The new Aeromarine "12" has the same bore and stroke as the A-G. 6. It is a "V" Type motor. Cylinders are cast separately from a special grade of Vanadium iron, having cylinder head with valve seats integral. The cylinder jackets are not incorporated in the casting, but are electrically deposited after all the machinery operations are performed. This allows of the casting being cleaned both inside and outside of cylinder bore, and insures a uniform water space with minimum weight. The cylinders are rough machined, then set out for aging, and after finished machining are ground to a mirror finish.



Aeromarine 12-cylinder motor.

The weight of the motor, complete, is approximately 750 lbs.

Aeromarine Plane & Motor Co., Nutley, N. J.

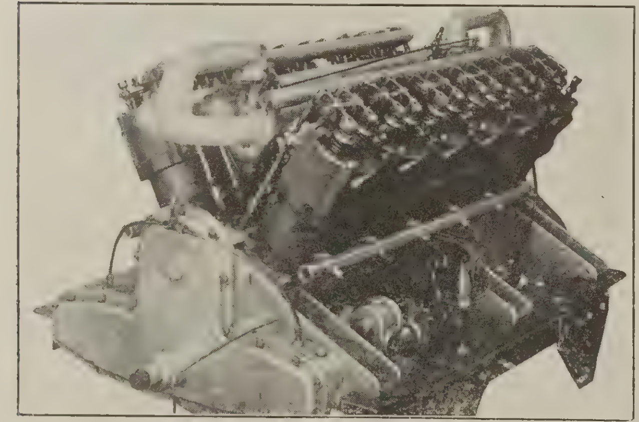
Ashmusen

The photograph clearly indicates the small amount of head resistance of the entire power plant of the improved Ashmusen 12-cylinder, 105 H.P., self-cooled aeronautical motor.

The new Ashmusen modern manufacturing plant is now producing these motors and the 8-cylinder, 70 H.P. motors exclusively and regularly.

The 70 H.P. motor weighs 240 lbs. and the 105 H.P. weighs 345 lbs. Bore and stroke 3¾ in. by 4½ in. Force feed oiling system, Dixie magneto and Ashmusen carburetor.

Ashmusen Mfg. Co., 266 Pearl St., Providence, R. I.



Atwood 12-cylinder motor.

Atwood

The Atwood 12 is a 12-cylinder 60 degree V type motor rated at 180 H.P. Displacement, 732.47 cu. in. Bore and stroke, 3.5 in. by 4.5 in. Compression 80 lbs.

Crankshaft speed, normal, 2,000 to 2,500 r.p.m.; maximum, 3,200 r.p.m.

Propeller speed, one-half the crankshaft speed by means of gear reduction in crankcase. Provision made also for connecting propeller direct to crankshaft.

Power delivery, normal, 120 to 150 h.p.; maximum, 190 h.p.

Total fuel consumption, approximately .65 lbs. per h.p. hour; dual ignition throughout, comprising two 12-cylinder magnetos and two sets of spark plugs; dual carburetors feeding one specially designed, shore-haul, circular manifold.

Starting apparatus, special 30 ft. lb. electric motor, capable of turning over the engine at 150 r.p.m.

Water cooling, forced circulation by means of 90 lb. pressure gear pump.

Motor complete with starter and dual ignition apparatus, weighs approximately 650 lbs. Without starter and one magneto, 580 lbs.

Overall dimensions, approximately 48 inches long, 27 inches high and 26 inches wide.

Atwood Aeronautic Co., Williamsport, Pa.

Beecher

The Beecher motor is of the horizontal opposed type. There are four cylinders, bore 3¾ inches by 4-inch stroke. Cylinder heads are detachable. Six rods go through the crankcase, from head to head, holding the cylinders in place. Push rods and rockers are returned by a spring, leaving the valve spring free of this work. A peculiar feature of this motor is the crossed rocker arms on one side. This arrangement permits the use of a single camshaft with only four cams operating eight valves. Nothing in the motor is offset.

There are but two main bearings, two camshaft bearings, two gears and only two connecting rod bearings. These are gudgeoned similar to the Gnome. Even the magneto has no gears, the distributor being driven from the camshaft

Built by Eugene L. Beecher, New Haven, Conn.

Christofferson

Runs of from two to six hours have been made by the Christofferson motor at full throttle, showing a maximum of slightly over 130 h.p.

Horsepower, 120 h.p. at 1,400 revolutions per minute. Bore, 4¾ inches. Stroke, 6 inches.

The cylinders are of one-piece steel, with the valve seat right in the head of the steel cylinder. Water jackets are aluminum. Water is in direct contact with the steel cylinder so that the heat does not radiate through the steel and then through the aluminum before it gets to the water. Seventy-five per cent. carbon and 3½ per cent. nickel steel is used for the cylinder, with a tensile strength of 165,000 pounds per square inch. The cylinder head is oval. The wrist pins are of chrome vanadium steel.

Cooling is by centrifugal water pump with a pressure of 220 pounds per minute.

Christofferson Aircraft Co., Redwood City, Cal.

Curtiss

The 12-cylinder Curtiss motor weighs but 3½ lbs. per horsepower, developing 250 H.P. at normal speed of 1,400 R.P.M. The cylinders are set V type.

Motor Speed: 1,400 R.P.M. normal; 1,500 R.P.M. maximum; 200 R.P.M. minimum.

Bore and Stroke: 5 x 7.

Weights: Motor, 1,125 lbs.; radiator, 120 lbs.; cooling water, 100 lbs.; propeller, 95 lbs.

Gasoline Consumption per Horsepower Hour: 6/10 lbs.

Oil Consumption per Hour at Maximum Speed: 2 pts.

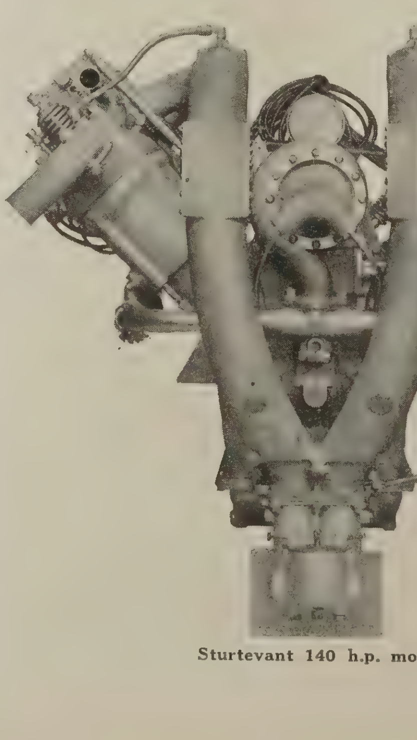
Overall length, 84⅝ in.; overall width, 34⅛ in.; overall depth, 40 in.; width at bed, 30½ in.; height from bed, 21⅛ in.; depth from bed, 18½ in.

Equipment: Magneto, carburetor, exhaust, manifold, radiator, propeller, tachometer complete, self starter, tools, shipping box.

Ignition: 2 tension 12-cylinder magnetos located on front of crankcase cover and driven off timing gears through new wear-saving flexible drive. Leather boot on magnetos. Rubber covers on spark plugs.

Carburetors: Four "Zenith." Each intake supplies one set of 3 cylinders through separate cast aluminum manifolds. Hot air intakes to carburetor through stoves around exhaust pipes. Auxiliary air intake in manifolds with hand control. Carburetor located between cylinders inside V.

Lubrication: Pressure feed. The oil is forced from reservoir in bottom of crankcase by gear-pump to one end of hollow camshaft, through camshaft to timing gears and all camshaft bearings and is carried to main bearings by separate pipe and through crankshaft throws to connecting-rod bearings and from connecting-rod through tubes on



Sturtevant 140 h.p. motor.

connecting-rods to piston pins. Return oil is pumped out of the splash-can into reservoir, so lubrication is not affected by the inclining of the motor.

Water Circulation: Centrifugal pump bolted to front end of crank-case cover and driven through spiral gears mounted on ball bearing shaft.

Cylinders: Made of high carbon steel drop-forging machined all over. Monel metal side wall brazed on. Outside of cylinder heavily nickel plated to prevent rust. Cylinders bolted to crankcase by 12 bolts.

Crankshaft: Heat-treated Chrome Vanadium forging, finished all over and drilled hollow. Six throw, seven main bearings. All bearings ground. End of shaft splined, tapered and threaded for propeller hub. Size of shaft 2½ inches, on crankpins, 2¾ on main bearings.

CURTISS "V-2"

200 H.P. Bore 5". Stroke 7". Weight with propeller hub, without oil or water, 690 lbs. Dead weight per rated H.P., 3.45 lbs.

CURTISS "OX-2"

The OX2 is an improvement on the well-known OX motor At 1,400 R.P.M. it develops 100 H.P. Net weight, 365 lbs.

Curtiss Aeroplane and Motor Corp., Buffalo, N. Y.

Detroit Gas Turbine

The makers claim that this motor develops a horsepower per pound and uses 80% less fuel than any other type of motor. Built for continued service and heavy duty. Furnished in three sizes, 100, 200 and 300 H.P.

Detroit Gas Turbine Corporation, Detroit, Mich.

Duesenberg

The Duesenberg aero engine is of the 60°-V pattern, with 12 cylinders of 4⅞ inch bore and 7 inch stroke. Its full speed is 1,400 revolutions per minute, at which it is expected to develop 300 horsepower. The weight with starter, generator, etc., ready to run is 1,040 pounds. The piston speed is comparatively low, which combined with lightness of reciprocating parts and with the self-balancing properties inherent in "twin-six" construction, will tend to minimize vibration. The propeller is mounted on the crank shaft.

The cylinders are semi-steel castings, weighing 51 pounds to the pair. The brackets supporting the valve-rockers are part of the cylinder castings, so that a pair of cylinders can be removed, with their rockers, without deranging the valve adjustment. An aluminum cover of V-form houses the valve gear of each four cylinders, and helps to stiffen the engine.

Duesenberg Motor Co., St. Paul, Minn.

Frederickson

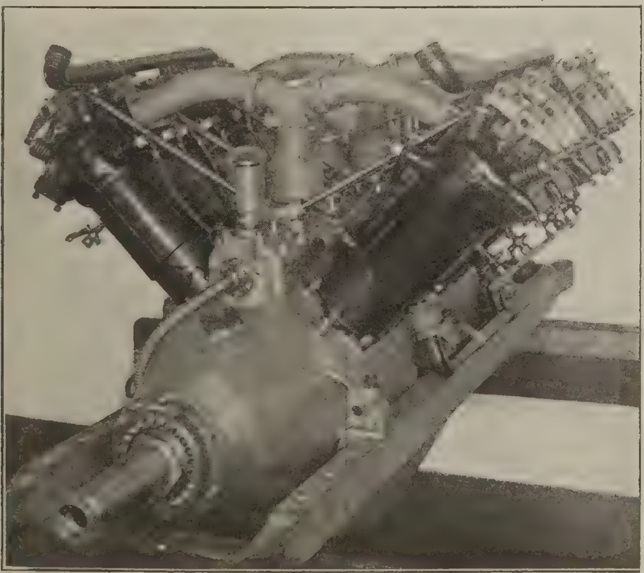
An aeronautical engine of a new principle has been developed by the World's Motor Company in 5 and 10 cylinder models, 70 and 140 h.p.

These motors, which are known as the Frederickson engines, are of the two-cycle type insomuch as they produce a power impulse for every cylinder at every revolution, but by means of an oscillating base valve operated by the connecting rod, the owners have developed an engine that, while it embodies the extra power impulse of the two-cycle and the usual simple 2-cycle construction, will largely do away with the difficulties and disadvantages that have, up to this time, prevented this type of motor from becoming anything more than a moderate success.

The crankcase is made of cast iron with a nickel steel ring shrunk over each end and it contains the seats for the valves which close the inner end of the cylinders.

The cylinders are also made of cast iron with circular cooling fins and by-pass connecting the inner and outer parts. The port in the outer part for this by-pass is so located that it is closed by the piston, except when the piston is near the inner dead center. The cylinders are supported *from their heads* by nickel steel studs threaded into double nuts under the nickel steel rings which surround the crankcase. Thus, all the revolving parts are supported in a nickel steel frame amply strong to withstand the stresses due to centrifugal force and gas pressure.

World's Motor Co., Hippodrome Theater Bldg., Peoria, Ill.



Martin 12-cylinder motor.

General Ordnance

Although rated at 200 H.P., the General Ordnance Type L. M. aircraft engine is claimed to actually develop 250 H.P. at 1,800 R.P.M.

The drive to propeller is by reduction gear, by ratio determined by conditions of each individual case. In the present motor the ratio of reduction is 2 to 1.

Eight cylinders are arranged V fashion, cast in pairs of Lynite, surrounded by water jacket.

Bore, 4.75 in.; stroke, 6.5 in. Piston displacement per cylinder, 115 cu. in. Total displacement per motor, 920 cu. in.

Main bearings, three in all, 3⅞, 4⅝ and 5½ inches long. Diameter, 2⅜ in.

Overhead valves of the poppet type, in a single row over the cylinders all completely covered in.

Zenith O8D carburetor with a 2-inch opening. The manifold is water-jacketed and heated by hot air.

Two 8-cylinder Splitdorf "Dixie" magnetos. Weight, 30 lbs. Firing order, 1-8-3-6-4-5-2-7.

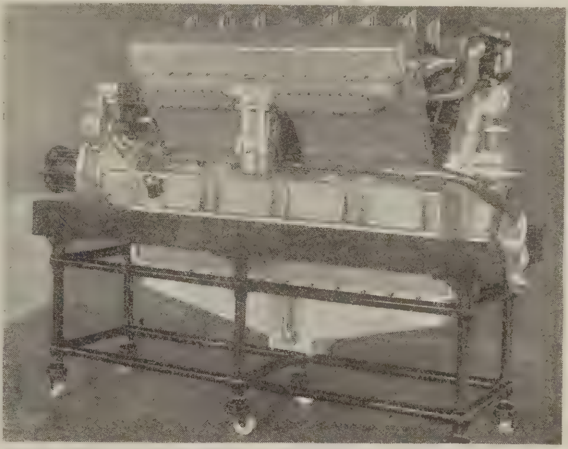
Weight of the motor complete with magnetos, water and oil pipes, starting handle, wiring, but without tanks, radiator, water, oil, tachometer and muffler, 876.25 lbs.

General Ordnance Co., Groton, Conn.

General Vehicle's Gnome

The General Vehicle Co. is turning out G. V. Gnome motors to the following specifications: The 100 H.P. Gnome Monosoupape, 9-cylinder revolving motor. Bore 110 m.m., stroke 150 m.m., R.P.M. 1,200. Weight, including carburetors and ignition, 272 lbs. Gasoline consumption per hour, 12 gallons.

General Vehicle Co., Long Island City.



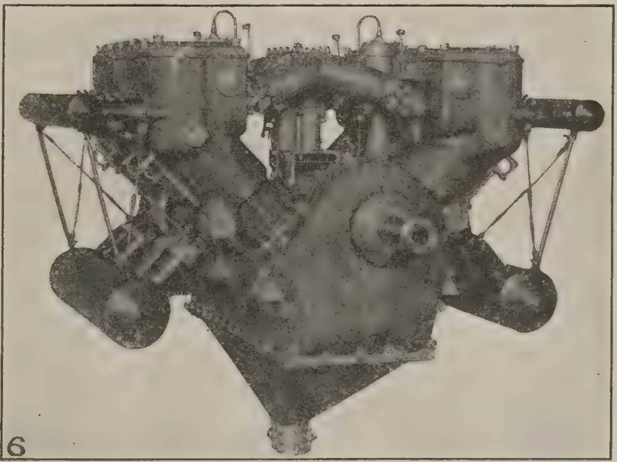
Knox 12-cylinder motor.

Gyro-Duplex

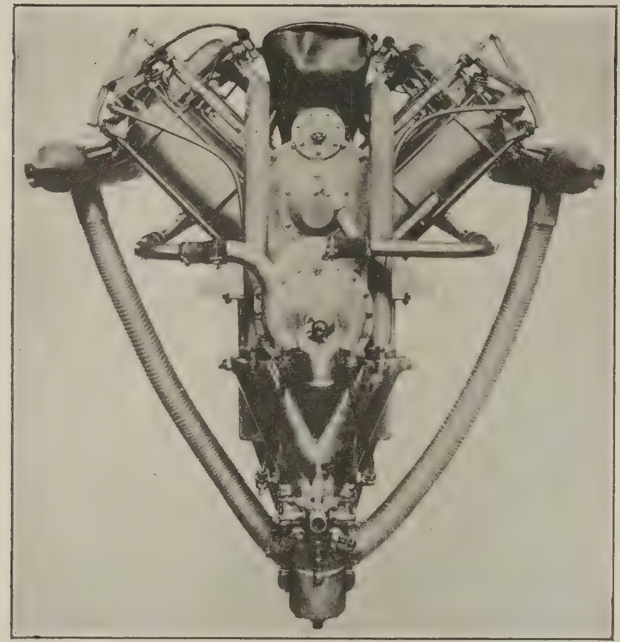
The Type L is a nine-cylinder revolving engine. Bore and stroke, 4½" x 6". 110 B.H.P. at 1,250 R.P.M. Cylinders and crankcase of steel. Cylinders machined all over. Exhaust valve in head. Piston-valve at base of cylinders acts as inlet and auxiliary exhaust. Weight 270 lbs. complete. Diameter, 37½". Length overall, 24.7". Gasoline consumption, 0.79 lbs. per B.H.P. per hr. Oil consumption, 0.16 lbs. per B.H.P. per hr.

The Type K is 90 H.P. and weighs 215 lbs.

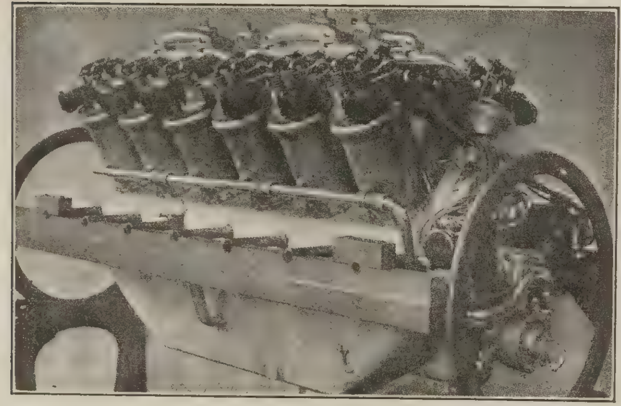
Gyro Motor Co., 774 Girard street, Washington, D. C.



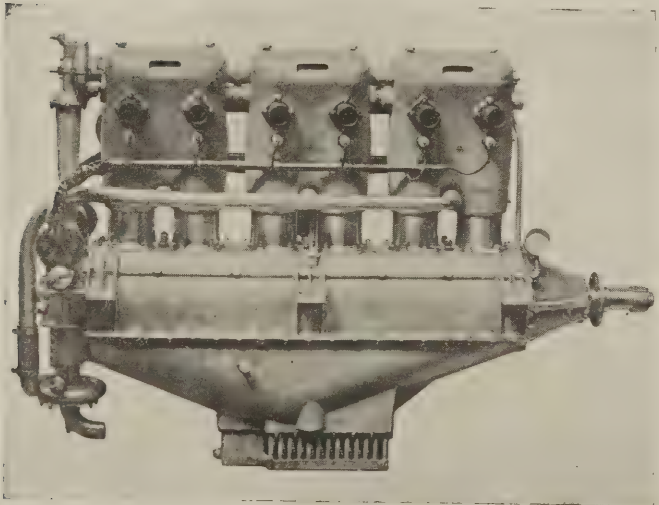
General Ordnance Company's 200 h.p. motor.



Curtiss V-2. 200 h.p. motor.



The Curtiss twelve.



Christofferson 135 h.p. motor.

Hall-Scott

The A-5 Hall-Scott is rated at 130 H.P. at 1,300 R.P.M., and the A-7 at 100 H.P. at 1,400 R.P.M. Weight of the former, 525 lbs., and of the 100 H.P., 410 lbs.

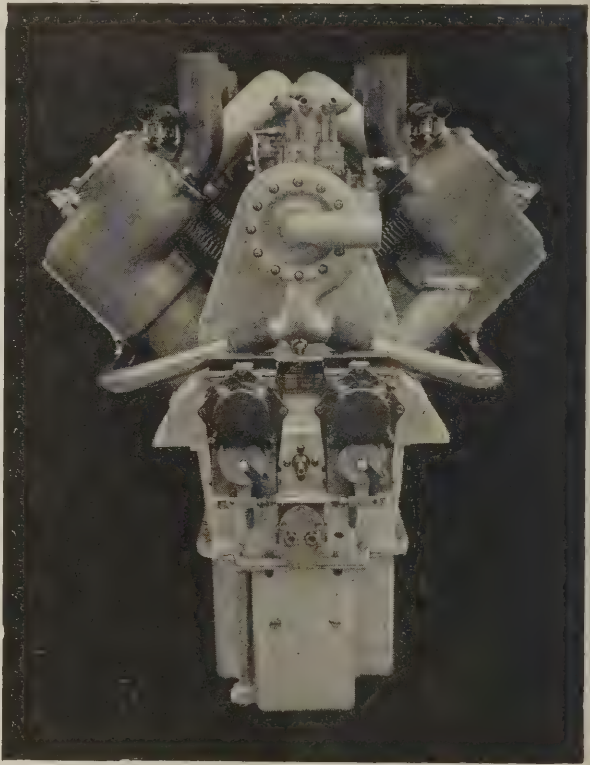
Bore and stroke, 5 x 7 inches Cylinders, 6 vertical and 4 vertical.

The manufacturers conducted an eight-hour running test under full load at their plant under the supervision of Hildreth & Company, well known New York consulting engineers. The average speed of the engine for the eight hours and ten minutes of test was 1,230 R.P.M., and the power deliver at this speed was 142 H.P. The engine consumed 10.25 gallons of ordinary garage gasoline per hour, and 0.50 gallons of oil during the same length of time. This is equivalent to only 0.45 lbs. of gasoline and 0.026 lbs. of oil per horsepower hour.

One of the most noticeable details is the neat way of enclosing the cams in an oil tight casing. Though the cams run in oil, there is no leakage even while the engine is running. Without question the whole arrangement of the valve mechanism is the most excellent feature of this engine. The valves, which have the large diameter of half the cylinder bore, make it possible to secure a high volumetric efficiency.

The camshaft, which is supported by four large bearings in the aluminum housing which is bolted to the top of the cylinders, is driven through bevel gears from a vertical shaft at the rear of the engine. This vertical shaft also drives the centrifugal water pump and the two Bosch magnetos. At the rear end of the camshaft is a small air pump and a connection for a tachometer.

The six cylinders are cast individually with integral jackets and heads. A large water space around the valves insures ample cooling. Lugs are cast on the sides of the cylinders near the top and are machined where they come in contact with the adjacent cylinders, so that when the long bolts which hold the cylinders to the crankcase are tightened up against washers supported by these lugs the cylinders are braced against each other like a solid block and add considerably to the rigidity of the engine.



Thomas aeromotor, showing self-starter, double magnetos, Tachometer drive, stabilizer drive, gasoline and oil cooling circulating pumps.

Hall-Scott Motor Car Co., San Francisco, Cal.

Kemp Type J-8

Eight-cylinder V-type, 4½" x 4¾". 80 H.P. at 1,150 R.P.M. Cooling by forced air circulation from centrifugal fan on crank-shaft. Five bearing crank-shaft Connecting rods side by side, and offset so cylinders are not staggered. Two Zenith carburetors. Mea Magneto. Weight 380 lbs. complete. Width overall, 25½". Height overall, 24½". Length overall, 29".

Kemp Machine Works, Muncie, Indiana.

Knox

The Knox 300 H.P. aeronautic motor weighs complete, including electric starting, electric lighting, tachometer exhaust pipes, ignition apparatus and provision for driving wireless telegraph apparatus, 1,400 pounds.

It was run for a period of eight hours in which its rated 300 horsepower was exhibited during the last hour.

The run averaged from 1,400 R.P.M. to 1,600 R.P.M. for the first seven hours, pulling from 200 to 245 H.P. and the 300 H.P. at 1,600 R.P.M. for one hour.

The average H.P. was 243 for the eight hours, making 1,948 H.P. hours, during which 198.4 gallons of gasoline were consumed, making .612 lbs. per H.P.H.

The motor is a 12-cylinder, 4¾ inches bore by 7 inches stroke and is a "V" engine with six cylinders on each side, set at 60 degrees from each other.

The Springfield Motor Co., Springfield, Mass.

Macomber

The seven cylinders of this engine are parallel and arranged around a central shaft in much the same way as those of the Trebert. The chief difference lies in the mechanism replacing the cranks and bevel gears. Reference to Fig. 18 will show that the pistons are connected by means of rods with ball and socket joints to a spider-plate which revolves with the cylinders. As the engine is revolved the pistons will reciprocate in the usual manner owing to the variation of the distance between each cylinder head and that portion of the plate exactly opposite it. Means are provided on the engine shown for changing the angularity of this plate, thus varying the stroke and also the compression.

Macomber Motor Co., Los Angeles, Cal.

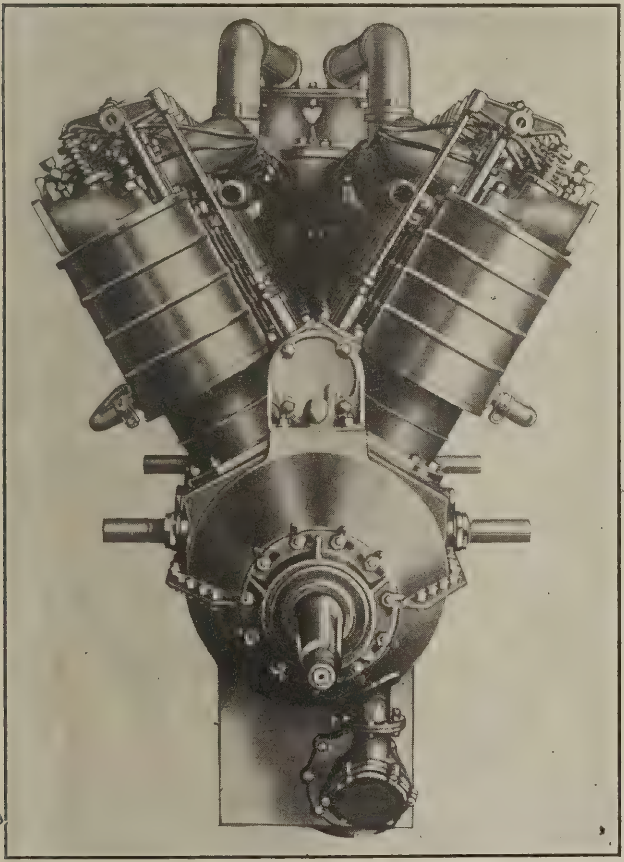
Martin

The Martin Model 8200 weighs 484 lbs. complete with magnetos and carburetors. Bore, 4⅝ inches; stroke, 7 inches.

190 brake horsepower developed at 1,400 R.P.M.

Eight-cylinder V, four-cycle, water-cooled. Cylinders are in line on each side, separated by an angle of 90 degrees.

At its official trial in the Aero Motor Testing Laboratory of the Navy Yard at Washington, D. C., this motor developed 183 brake horsepower at 1,326 revolutions per minute. This means a value of the brake mean effective pressure of over 116 pounds per square inch.



Van Blerck aviation motor

Maximotor

Maximotors are made in sizes of 50 H.P. (4 cyl.), 70, 90 and 120 H.P. The 50 H.P. weighs 200 lbs. net; 70 H.P.

Special attention has been given to such important factors as overhead valves, ball-bearing crankshaft, aluminum alloy pistons, force-feed oiling system under high pressure, welded steel water jackets, and a liberal use of chrome nickel and other alloy steels best suited for the particular purpose.

Maximotor Company, 1526 E. Jefferson Ave., Detroit, Mich.

Orlo

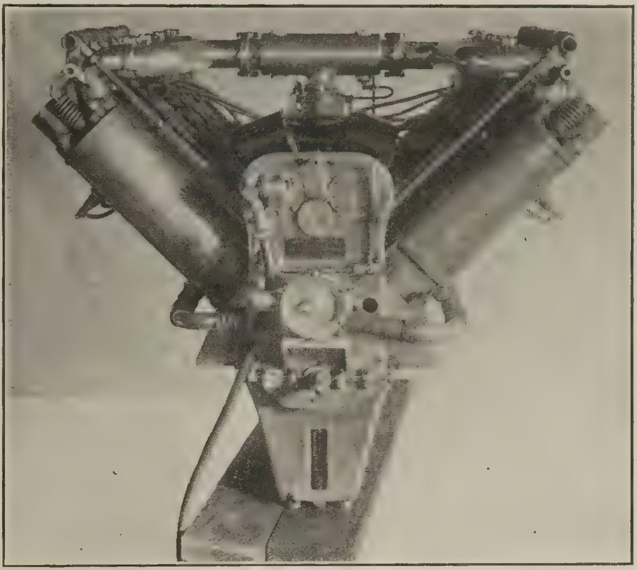
This motor weighs 475 pounds, complete with magnetos and carburetor, but without radiator and propeller, and delivers 125 horsepower at 1,400 R.P.M. The liberal size valves and straight cylinders allow of a much higher speed, however, if desired, with a correspondingly greater horsepower.

The cylinders are of special gray cast iron. The cylinders are cast separate and are machined up both inside and outside, which is a very important feature, in order to insure perfect cooling and prevent ignition.

The cylinders and pistons are thoroughly annealed and heat-treated, after being rough machined, to relieve all strains.

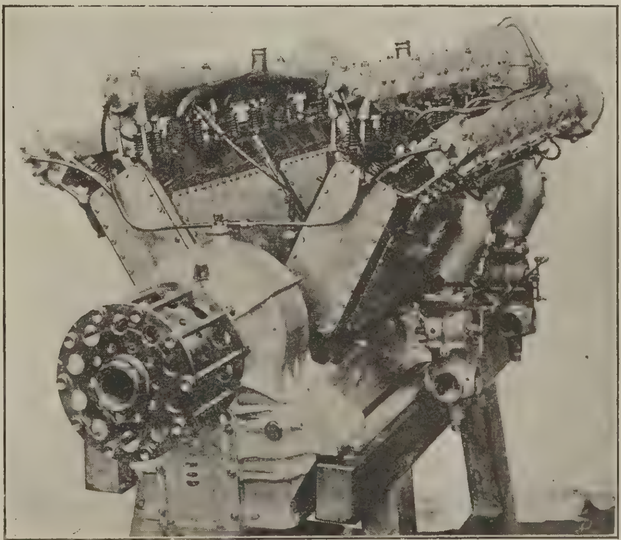
The cylinder water jackets are of spun brass, zinc-plated, with a very liberal allowance in water space between jacket and cylinder.

Orlo Motor Co., Rochester, N. Y.

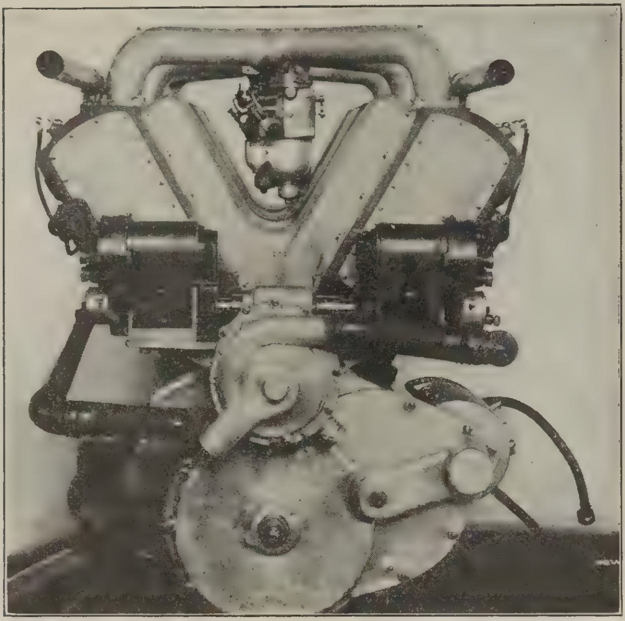


End view Orlo Model 0-8

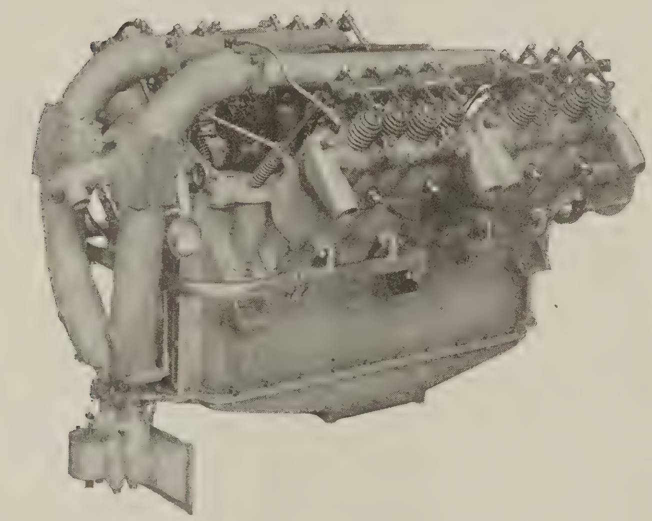
Ashmusen twelve-cylinder.



The Sterling-Sunbeam twelve.



End View Duesenberg 12-Cylinder Aero Engine



Aviation motor of the B. F. Sturtevant Company.

Williams 125 h.p. motor.

Packard

The Packard is a 12-cylinder V type motor developing 100 H.P. at 1,400 R.P.M. A 250 H.P. Packard is also being made.

In the 100 H.P. the bore and stroke is 2 21/32 in. by 4½ in. This has a cubic displacement of 300 cu. in. Weight, 500 lbs. The 250 H.P. motor has a bore of 4 in. and a stroke of 6 in., with approximately 900 cubic inches piston displacement.

The design of the aviation engine is based upon that of the Packard automobile twin-six, but it differs very greatly in detail. The cylinders are cast in blocks of three and have four overhead valves apiece.

Packard Motor Car Co., Detroit, Michigan.

Rausenberger

The Rausenberger C-12 has a bore of 4⅛ inches and a stroke of 6 inches. It is rated at 150 H.P., and the normal speed is given as 1,400 R.P.M. The overall length and width are 5 feet 10 inches, and 23½ inches respectively.

The cylinders are of fine grained, annealed cast iron, with spun copper water jackets which are pressed on and secured by thin steel rings shrunk on.

The 12-cylinder model follows the same general construction as the "eights," except that it has twelve cylinders arranged with an angle of 60°.

The cylinders are staggered, which makes it possible to place the connecting rods of opposite cylinders side by side on the same crank pin.

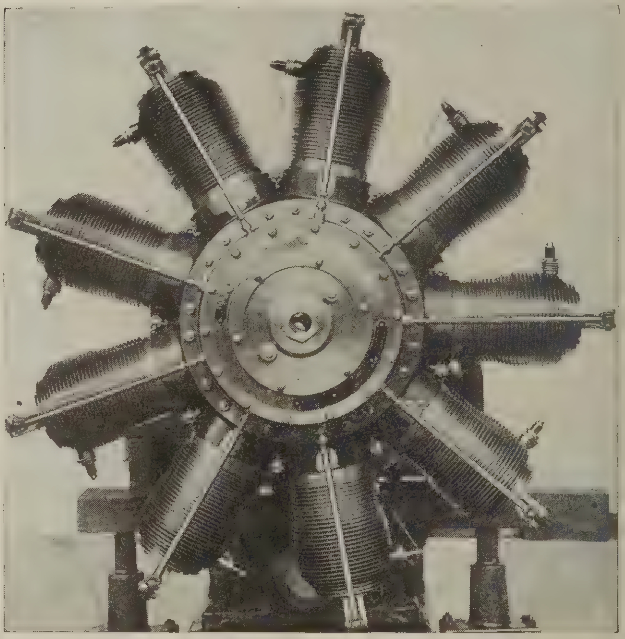
Net weight, 750 lbs.

Dayton Aero Motors Co., Dayton, Ohio.

Roberts

The 100 H.P. Roberts "6X" weighs 325 lbs. Its rated H.P. is developed at 1,200 R.P.M. Bore, 5"; stroke, 5".

The motor is extremely simple, the only moving parts being the pistons, connecting rods and crankshaft. There are no valves or cams or camshafts, springs, push rods or any other delicate working parts; the only gears on the motor are those used for the magneto and pump drive.



General Vehicle Company's aviation motor

The motor is exceedingly compact, measuring only 49 inches in length over all, the base being only 14 inches in width and the height above the center line of the crankshaft only 20 inches.

There are so few working parts in the motor that the manufacturers are enabled to make the working parts exceptionally liberal in size. They claim that the bearings and crankshaft are 50 to 75 per cent. larger than in any other motor of the same power.

The cylinders are special grey iron castings, with the water jackets integral and are machined all over. The pistons are of aluminum alloy and there are three one-piece rings to each piston. Connecting rods and crankshafts are drop forged vanadium steel, the crankshaft is 2½ diameter, bored hollow for lightness in weight.

There are seven main crankshaft bearings, the bearings between each crankcase section being 2½ by 2½. On the magneto and of the motor the bearings is 4 by 2½, while on the propeller end the bearing is 6 by 2½. The connecting rod bearings are 1¾ by 2½; all bearings are of a special high-grade die cast nickel babbitt.

Roberts motors are also made in the following models: 6XX, 165 H.P., weight 650; E-12, 350 H.P., 990 lbs.

The Roberts Motor Mfg. Co., Sandusky, Ohio.

Sterling-Sunbeam

The Sterling Engine Co. has acquired the American rights and license for manufacturing the Sunbeam-Coatalen aeromotors, known in this country as the "Sterling-Sunbeam."

The motor is built under the plans and formulas and direction of the Sunbeam Motor Car Co., Wolverhampton, England. The New Sterling-Sunbeam motors are built in the following sizes: 8-cyl., 150 H.P.; 12-cyl., 220 H.P.; 12-cyl., 320 H.P

General specifications are: Bore and stroke, 90 mm. by 150 mm. Crankcase, special strong aluminum alloy.

Special air distributor fitted with valves and pipes, complete, ready for coupling up to a compressed-air bottle.

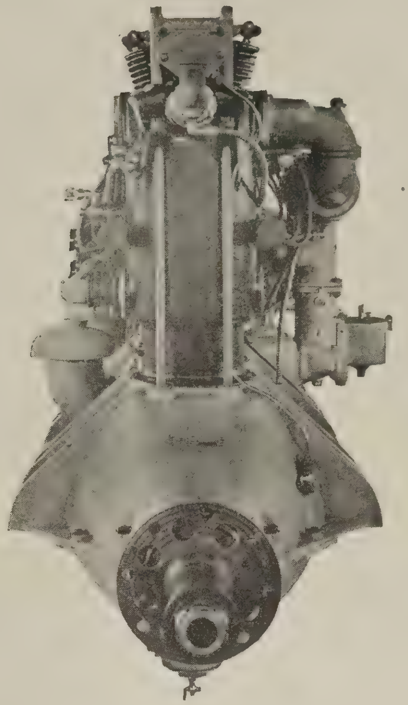
Ignition: 2 high-tension, 6-cylinder magnetos.

Carburetors: 4 C. Z. 40 mm.-type Claudel Hobson.

Normal revolutions of the engine 2000 R.P.M., giving a propeller speed of 1000 R.P.M.

The consumption of gasoline is about .58 of a pint per H.P. hour and the consumption of oil is about ¾ gallon per hour.

The Sterling Engine Co., 1352 Niagara St., Buffalo, N. Y.



Front end of the new A-5 Hall-Scott engine, showing the small head resistance offered by this type of engine

Sturtevant

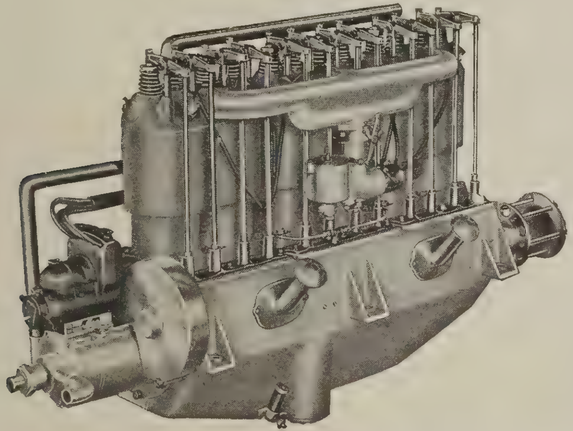
The 5-A, 140 H.P. aeronautical engine is of the 8-cylinder V type, four-stroke cycle, water cooled, having a bore of 4" and a stroke of 5½", equivalent to 102 mm. x 140 mm. The normal operating speed of the crankshaft is 2,000 R.P.M. The propeller shaft is driven through reducing gears which can be furnished in different gear ratios. The standard ratio is 5:3, allowing a propeller speed of 1,200 R.P.M.

The construction of the motor is such as to permit of the application of a direct drive. The change from the direct drive to gear drive, or vice versa, can be accomplished in approximately one hour. The gear drive construction is particularly adaptable to dirigible work.

Cylinders are cast in pairs from an aluminum alloy and are provided with steel sleeves, carefully fitted into each cylinder.

Cylinder heads are cast in pairs from aluminum alloy and contain ample water passages for circulation of cooling water over the entire head. Trouble due to hot valves is thereby eliminated, a most important consideration in the operation of an aeroplane motor. The water jacket of the head corresponds to the water jacket of the cylinders and large openings in both allow the unobstructed circulation of the cooling water.

The valves are located in the cylinder heads and are mechanically operated. The valves and valve springs are especially accessible and of such size as to permit high volumetric efficiency. The valves are constructed of hardened tungsten steel, the heads and stems being made from one piece. The valve rocker arms located on the top of the cylinder are provided with adjusting screws. A check nut enables the adjusting screw to be securely locked in position, once the correct clearance has been determined. The rocker arm bearings are adequately lubricated by a compression grease cup. Cam rollers are interposed between the cams and the push rods in order to reduce the side on the push rods.



Aviation motor of the Maximotor Company.

The pistons are made from a special aluminum alloy; are deeply ribbed in the head for cooling and strength and provided with two piston rings. These pistons are exceedingly light weight in order to minimize vibration and prevent wear on the bearings. The piston pin is made of chrome nickel steel, bored hollow and hardened. It is allowed to turn, both in piston and connecting rod. The piston rings are of our own special design, developed after years of experimenting in aeronautical engines.

Connecting Rods: The connecting rods are of "H" section machined all over from forgings of a special air hardening chrome nickel steel which, after being heat treated has a tensile strength of 280,000 pounds per square inch. They are consequently very strong and yet unusually light and being machined all over are of absolutely uniform section, which gives as nearly perfect balance as can be obtained. The big ends are lined with white metal and the small ends are bushed with phosphor bronze. The connecting rods are all alike and take their bearings side by side on the crankpin, the cylinders being offset to permit of this arrangement.

The crankshaft is machined from the highest grade chrome nickel steel properly heat treated in Sturtevant furnaces in order to obtain the best properties of this material. It is 2¼" in diameter (57 mm.) and bored hollow throughout, insuring maximum strength with minimum weight.

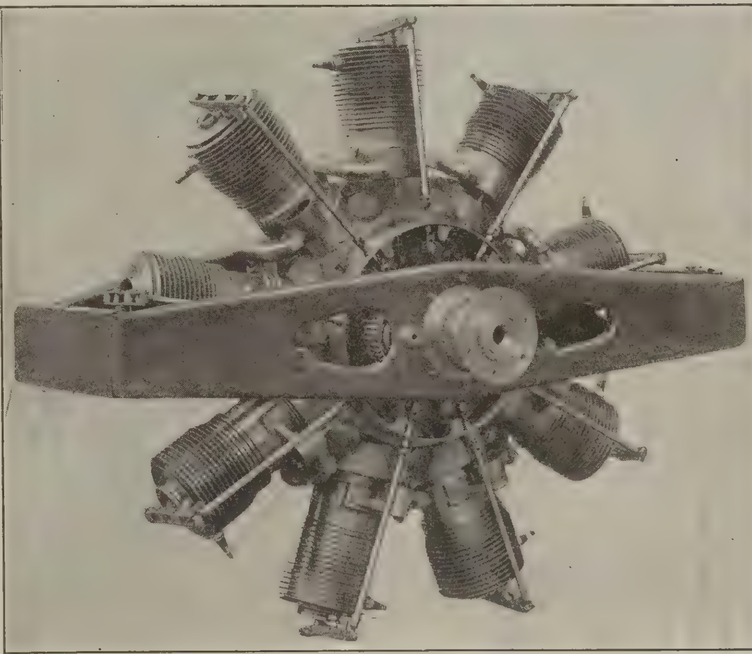
The base is cast from an aluminum alloy. Great strength and rigidity is combined with light weight. The sides extend considerably below the centerline of the crankshaft, providing an extremely deep section. At all highly stressed points, deep ribs are provided to distribute the load evenly and eliminate bending.

Sump: The lower half of the base is of cast aluminum alloy of extreme lightness. This collects the lubricating oil and acts as a small reservoir for same. An oil filtering screen of large area covers the entire surface of the sump.

Propeller Shaft: The propeller shaft is carried on two large annular ball bearings driven from the crankshaft by hardened chrome nickel steel spur gears. These gears are contained within an oil-tight casing integral with the base on the opposite end from the timing gears. A ball thrust bearing is provided on the propeller shaft to take the thrust of a propeller or tractor as the case may be.

B. F. Sturtevant Co., Hyde Park, Mass.

250 h.p. Packard motor.



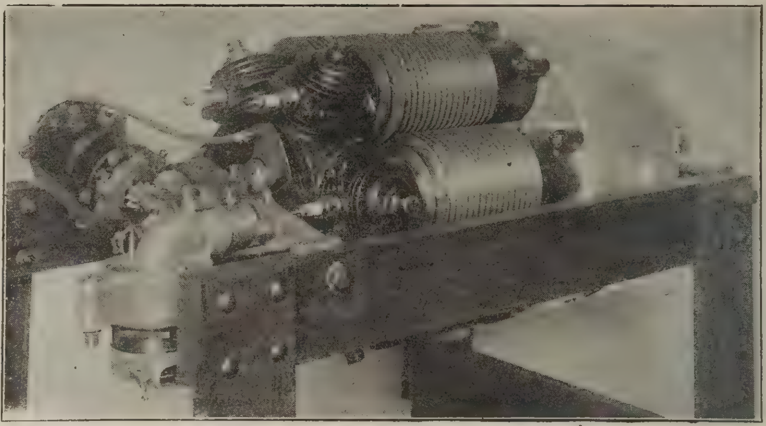
Gyro rotary aviation motor.

Trebert

This engine is in reality a group of six-cylinder engines arranged about a central shaft, with their cylinders parallel, and their crankshafts extending radially from the central shaft. The ends of these individual shafts may be seen in Fig. 16. At the inner end of each shaft is a small bevel gear which engages with one central bevel gear of twice its diameter. The central gear is held stationary, the cylinders being allowed to revolve, thus assisting the air-cooling of the engine because of the blower action while revolving.

The particular ratio between the crankshafts and the central gear causes the pistons to make four complete strokes during one revolution of the engine; hence there will be six power strokes per revolution. A type of rotary valve is used, the distinctive feature being a sleeve passing through the combustion chamber, which is held to the valve by a spring, the idea being to reduce leakage. The valve is stationary.

H. L. F. Trebert Engine Co.,
465 St. Paul St., Rochester, N. Y.



Trebert Revolving Engine

Van Blerck

The Van Blerck model F-12 has twelve cylinders arranged 60° V, and staggered to provide for independent connecting rod bearings on crank pins. Cylinder bore is 4½" and stroke 5½", giving a piston displaceemnt of 1049.7 cubic inches. The rated power of 185 H.P. is delivered at a speed of 1,400 r.p.m. The motor weighs 600 pounds without propeller, radiator, self-starter, lubricating oil, water and fuel.

Crankshaft is of chrome nickel steel, drop forged and double heat-treated, machined all over and carefully balanced. Drive end is taper turned to receive propeller flange. Crankshaft is drilled hollow for the forced feed lubrication system and for lightness. All bearings are of high-grade babbitt and they are easily replaced. The bearings in the crank case are of the bronze shell babbitt-lined type and they are interchangeable.

Cylinders are forged from special high-grade steel, and with cylinder head integral. They are carefully heat-treated and accurately ground to size. Cylinders are bolted to crank case with chrome nickel studs passing through flange at lower end and securely nut-locked.

Water jackets are of spun copper.

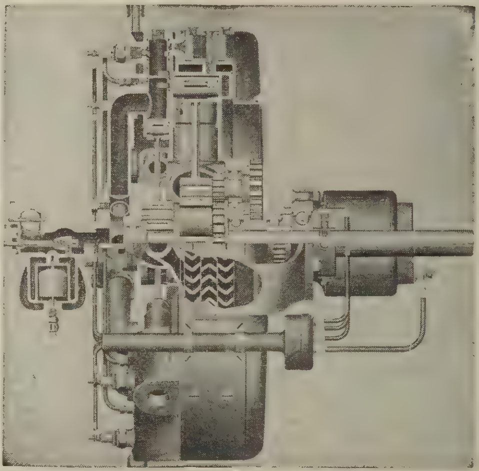
Van Blerck Motor Co., Monroe, Mich.

Williams

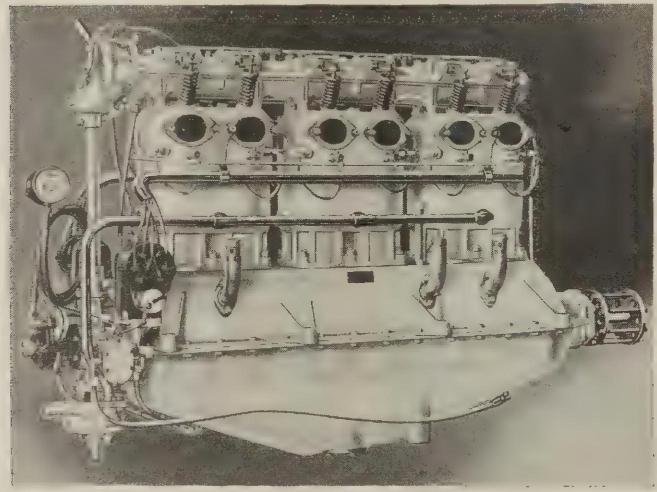
After exhaustive testing, the Wililams motor has been put on the market with a rating of 125 H.P. This is of the "V" type with 8 cylinders at 90 degrees.

Overhead valves, exhaust at sides. Cylinders separate and bolted to crankcase. Water-cooled.

O. E. Williams Aeroplane Co., Fenton, Michigan.



Detroit gas turbine.



Wisconsin aviation motor.

Wisconsin

The Wisconsin Aviation Motors are of the direct drive valve in the head type, with 3-inch valves set on an angle of twenty-five degrees from the vertical and operated by overhead camshafts through rocker arms. The motors have a bore of 5 inches and a stroke of 6½ inches and they are built in both six and twelve cylinders.

The cylinders are cast in pairs, and are set vertical on the six-cylinder motor and inclined on an angle of sixty degrees to each other in the twelve.

The speed of the motors is from 1,200 to 1,400 R.P.M.

The six-cylinder will develop 130 H.P. at 1,200 and 145 H.P. at 1,400 R.P.M.

The twelve-cylinder will develop 250 H.P. at 1,200 and 280 H.P. at 1,400 R.P.M.

The fuel consumption is from .6 to .7 pint of gasoline per horsepower per hour and the lubricating oil consumption .03 pint or less per horsepower per hour.

The capacity of the oil chamber is four gallons on the six and six gallons on the twelve.

The weight of the six-cylinder is 600 pounds, with carburetors and magnetos. The weight of the twelve is 1,000 pounds.

Wisconsin Motor Mfg. Co., Sta. A, Dept. 332
Milwaukee, Wis.
N. Y. Branch, T. M. Fenner, 50 Church St.

Thomas

Tests of the Thomas motors have been made at full throttle showing a maximum of slightly over 150 H.P. As it has been proven that it is practically impossible to get either reliability or durability in an aeroplane motor run at its maximum power continuously, it has been decided to change the rating of the Thomas motor from 150 H.P. to 135 H.P. at 2,000 R.P.M.

Type: High speed 8-cylinder "V" motor, 4-cycle
Bore: 4 inches.
Stroke, 5½ inches.
Motor, R.P.M.: 2,000 to 2,5000.
Propeller, R.P.M.: Any desired speed from 1,000 to 1,500.
Oiling: Force feed to all bearings. Sufficient oil carried in sump for five-hour flight.
Carburetor: 2 inch, double barrel Zenith.
Ignition: Splitdorf "Dixie 8," driven at crankshaft speed.
Self Starter: Christenson gasoline air starter.
Gasoline Consumption: 14 gals. per hour.
Oil Consumption: 1 gal. per hour.
Weight: Complete with carburetor, magneto, starting crank, propeller bolts, and front plate, but without propeller and radiator—550 lbs.

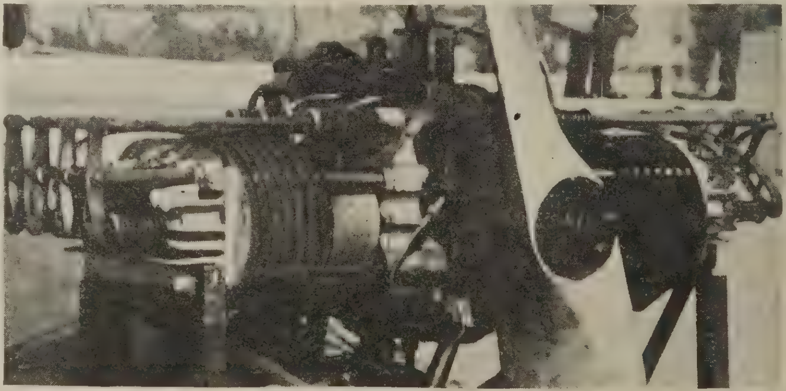
Thomas-Morse Aircraft Co., Ithaca, N. Y.

Wright-Martin

The 8-cylinder "V" Hispano Suize, manufactured by the Wright-Martin Aircraft Corp., is rated at 150 H.P., although developing 155 H.P. at 1,450 R.P.M. Bore and stroke, 4.72 inches by 5.1 inches. Piston displacement, 672 cubic inches. Weight, complete with starting magneto and hand cranking reduction gear, 410 lbs. Weight net, 390 lbs.

Clandel carburetor and 2 Splitdorf magnetos. Castor oil force feed. Continuous circulation.

Wright-Martin Aircraft Corporation, 60 Broadway, N. Y. City.



Beecher horizontal motor.

ACCESSORIES & EQUIPMENT

The Abercrombie & Fitch Company, New York City. Aviation Clothing

The U. S. Government has placed a large order with the Abercombie & Fitch Company for aviators' costumes made entirely of leather, the coat having a detachable fleecy lining, is belted and has large bellowed pockets lined with very heavy duck. The trousers are full and roomy and thong-tied at the bottom.

This company also puts out an all-rubber seaplane costume. These suits are shown at the Exposition together with complete models of practical leather clothing.

Ackerman Wheel Co., Cleveland, Ohio. (A. H. Ackerman, President.) Manufacturers of special aeroplane wheels.

It has been the desire of aeroplane constructors to produce an aeroplane wheel which will have the necessary resiliency and which at the same time will possess features of lightness combined with strength.

From the result of recent tests it would seem that the Ackerman Wheel Company have gone a long way in the right direction to secure this result. A wheel constructed for an aeroplane weighing about 1,000 pounds was attached to a case containing 1,500 pounds of sand. A side thrust blow was given the wheel and it was calculated that it withstood a shock of 2,700 pounds without apparent injury.

Aluminum Casting Co., Cleveland, O.

Aluminum constitutes 8 per cent of the earth's crust and its use in aeroplane motors, ingots, fittings, castings, etc., is becoming more and more extensive. In the foundries of the Aluminum Castings Company technically trained men supervise every stage in the evolution of a casting from the analysis of the virgin ingot to the delivery of the casting to the sand blast. Every foundry has a pyrometer, each casting being poured at the temperature an expert has determined to be the proper one. This is to insure that every casting of this company is as strong as possible.

American Metal Co., New York

This company specializes in the production of sheet aluminum with rolling mills at Cleveland, Ohio, and with its vast resources and the fact that it is the exclusive agent for the Cleveland Metal Products Company, puts it in a strongly fortified position for efficient deliveries.

American Vanadium Co., New York

The American Vanadium Company makes a specialty of a vanadium steel which is used so largely in the production of war material and especially in the production of aero motors.

The Sturtevant Aeroplane Company also utilizes this material for the construction of the various sections of their aeroplanes.

The Davis Non-Recoil Gun also contains a considerable quantity of this metal.

Beam Aviation School

The Beam Aviation School uses a Thomas Model E Pusher Aeroplane on its flying field, which is located at Celina, Ohio. The local facilities for ice flying enables this company to maintain a schedule of well over 100 minutes in the air each day. The instructors are Billy Brock and Monte Rolfe.

Arthur Brock, Jr.

The Brock Camera is destined to be of inestimable service to the aviation arm of the military service. The camera is designed to make automatic exposures over enemy tents and to present a report of what is literally a slow motion picture of the route traversed by the aeroplane.

The Buck Automatic Torpedo Company. (Booth 223)

With the recent tremendous significance to our air service, the invention of Dr. Buck will undoubtedly become very important. The machine controls a small aeroplane stabilized but with no pilot and carrying a torpedo equipped with two 18 H.P. motors. It is claimed that this machine when launched from the track will proceed in a straight line for several miles and when properly loaded up with high explosives can be made an effective weapon, for instance, in trench warfare.

Chemical Products Co., 93 Broad St., New York (Pres. A. D. Little)

As the use of aeroplanes for strictly peaceful purposes increases, the question of the inflammability of the wing surface seems destined to become more and more important. The Chemical Products Company, manufacturers of cellulose acetate aero dopes, have recently described some tests, which, though very simple in themselves, show in a striking way the great fire-resisting properties of their cloth varnishes or "dopes." If, for example, a lighted match be applied to a coating of their 1B or 101N dope on linen or cotton, the fabric is not ignited until the coating has melted or charred away. However, if a nitro-cellulose (or pyroxylin) dope has been used instead, the coating itself starts to burn at once, and in turn sets fire to the cloth. Still more striking is the fact that a red hot piece of iron can be applied to and held in contact with a piece of linen or cotton coated with the 1B or 101N dopes above referred to, with no production of fire. On the other hand, the same treatment applied to a pyroxylin coated surface results in the immediate ignition of the coating and the fabric is quickly consumed. These are tests which any one can easily try for oneself, and show the great superiority as regards non-inflammability of the cellulose acetate dopes made by the Chemical Products Company. In addition to this there is no impairment of the wearing qualities or weather resisting properties, because of the non-inflammable feature, the 1B and 101N dopes being equal to best on the market in these respects.

The Christensen Engineering Company, Milwaukee, Wis., Manufacturers of the "Christensen Self-Starter System." (Booth 222.)

The Christensen automatic self-starting system is designed to supply the compression stroke of the engine without the engine itself being in operation. This is accomplished by means of compressed air which is automatically and instantly converted into a rich gasoline mixture and automatically delivered to the cylinders in successive firing order, where it is exploded by the regular ignition system.

The apparatus to accomplish this is extremely simple. It is comprised of a small, highly efficient air compressor, a clutch for the same, an automatic carbureter capable of instantly converting the compressed air into gasoline gas under all pressures above that of the atmosphere, an automatic distributor, and air reservoir and a control valve whereby all the functions of the starter are controlled from the driver's seat.

The Christensen self-starter is constructed on a strictly scientific principle and all of its parts for properly carrying out this principle are thoroughly protected by patents and pending applications. The ultimate form of starter is one which in itself performs the function of starting the engine in its natural cycle of operation. This is accomplished in a most admirable way in the Christensen starter which can be seen by the following synopsis:

Showing Installation of "Christensen" Self-Starter on Aeronautical Thomas Motor. "Christensen" Starters are Equipment on Thomas Motors

The engine when running uses air and gasoline as its power in the proportion of about one part of gasoline to 1,300 parts of ordinary air. This air and gasoline vapor is compressed in the engine cylinders, and immediately thereafter exploded by an electric spark and that is what keeps the engine running.

The engine when standing still cannot of itself produce these compressions and explosions, but the crankshaft must be turned manually or by some other power to start the cycle of operation before the engine can create its own compressions and explosions.

The Christensen self-starter furnishes this gasoline vapor and air in compressed and ready-made form to the engine and the explosion of this gas makes the engine go as soon as it enters the cylinders. The Christensen self-starter is, therefore, a scientific instrument which artificially supplies the medium on which the engine operates.

The Cold Light Manufacturing Company, Denver, Col. Commercial subsidiary of the Schlesinger Radium Company. (Booth 230.)

At the Exposition there is being shown publicly for the first time "Marvelite," a superior Radio-Luminous material.

"Marvelite" is not to be confused with materials manufactured with Mesothorium or the old-style phosphorescents; the sole source of its light is radium. It can be seen against the brightest moonlight, and will make itself visible on any object in the dark without match or current. It is permanent for all practical purposes, can be washed without being lacquered, and has been accepted by the United States Government, with whose specifications it conforms in every particular; the Canadian inspector of military stores also has approved it.

This first exhibit of "Marvelite" at the show will be found original and of the greatest scientific and commercial interest. It will be with that of the Taylor Instrument Companies, whose compasses and barometers afford a practical demonstration of this material in use.

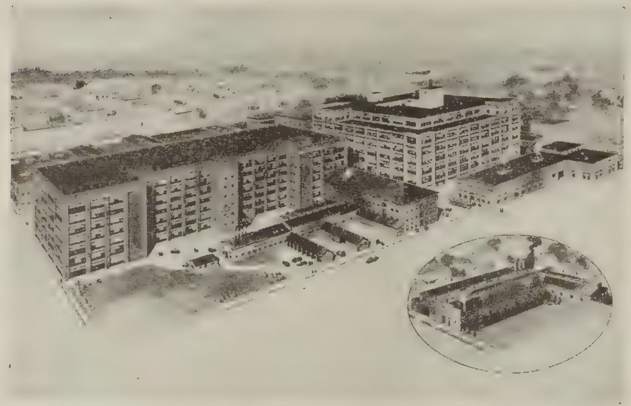
The progress of the process of making "Marvelite" will be shown step by step with views of the mines, the reduction works and the laboratories, and with samples of carnotite ore and of radium in its final degree of purity. Manufacturers in particular are invited. Detailed information of much interest to them will be given in both graphic form and booklets.

Davenport Aviation School, Davenport, Iowa. (Billy T. Cook, designing engineer; J. R. Hutchinson, chief instructor.)

During the winter months the Davenport Aviation School has been located at Lake Pontchartrain, near New Orleans, La., and the enrollment of students has already commenced with much success. Mr. J. Raymond Hutchinson, chief instructor, arrived there several weeks ago and the instruction of pupils has already commenced under his supervision. Mr. Hutchinson is using the Davenport type flying boat, which has proved its merits on many flights. Its simplicity of control is the principal feature of this type machine and endurance and altitude flights have proven to those in the vicinity of Davenport, Iowa, that it is considerable above the average. On a flight from Davenport to Lansing, Iowa, a distance of 220 miles, the time was 140 minutes, and an altitude of 10,000 feet was attained.

Before Mr. Billy Cook left Davenport such interest was created in aviation that three of Davenport's most prominent business men affiliated themselves with the organization. Mr. D. R. Lane, Decker French and W. R. Lane are the gentlemen referred to who became related in a financial manner for the purpose of building several of the Davenport type machines to demonstrate to the Federal government with prospects of securing an order for one or more. As soon as this is accomplished the manufacturing plant will be enlarged.

Dayton Engineering Laboratories Co., Dayton, Ohio. Manufacturers of "Delco" self-starters for aero engines. (Booths 242-244.)



This company that has done such a vast amount of research work in the automobile industry is now turning its limitless resources toward the problems peculiar to the aeronautic industry. The vast laboratory which has hitherto been a clinic of automobile engineers will expand its activities and include all kinds of experimental work with aeronautical appliances. Their first attention will be given to the subject of ignition and doubtless within the next brief period the entire aeronautic industry will be their debtors on account of the results of their experiments.

Goodyear Tire & Rubber Co., Akron, Ohio. (F. A. Seiberling, President). Manufacturers of kite balloons, dirigibles, aeroplane fabrics and aeronautical rubber goods. (Contractors to the U. S. Army and Navy and Other Governments.) (See photo of Goodyear Kite Balloon on page 62.) (First floor—Booths 245-246.)

With characteristic patriotism, the Goodyear Company has instructed a large section of their employes to devote their exclusive attention to the development of their balloon and dirigible productions. The present national emergency will undoubtedly give this section vast significance and it is calculated that they are doing everything in their power to facilitate those required by our government of this type of craft.

The latest type of kite balloon produced by the Goodyear people is 80 feet long and has a capacity of 25,000 cubic feet. It is stated that the balloon will not shift, veer or yaw, even in a stiff gale.

Geuder, Paeschke & Frey Co., Milwaukee, Wis.

From the vast importance of the experience which this company has gained in the automobile field, with the production of pressed steel parts, it is certain that their facilities will be welcomed by the aeronautic industry. The company is prepared to produce pressed steel parts of guaranteed lightness and strength and its production is backed by 35 years' experience.

Janney-Steinmetz & Co., Philadelphia. Cylinders for balloon equipment; high pressure gas containers. (Booth 224.)

This exhibit consists of high pressure hydrogen cylinders for balloon equipment as well as oxygen and other high pressure gas containers, for which products this company is justly noted. There is also shown a full line of forged bronze, high pressure valves for controlling pressures in the containers. There are models and patents, drawings and illustrated sketches of the use of various aerial warfare devices, particularly the Pendant Bomb that has been used with such telling effect by the aeronauts abroad in attacks on captive observation balloons and dirigibles. There are also shown seamless steel shapes for aeroplane equipment.

Keasbey & Mattison Co., Ambler, Pa. (Booth 280.)

Portland cement concrete, because of its weather and fire-resisting qualities, is an ideal covering for buildings. However, in order that it may be employed successfully in the form of plates, sheets or thin layers to be applied to framed structures some form of reinforcement must be used to provide the necessary tensile strength. Steel and iron are not suited for this purpose, as they are in time destroyed by air and moisture unless deeply embedded in the cement.

Efforts have, therefore, been made to discover some reinforcing material which would lend the necessary tensile strength and toughness to the cement, but which would be unaffected by atmospheric influences. Such a material has been found in asbestos, or mineral flax, which is a fibrous hydrated silicate of magnesia.

The problem of manufacturing corrugated sheets was taken up some ten or twelve years ago by interests connected with the Keasbey & Mattison Co., of Ambler, Pennsylvania.

The result has been to produce a strong and thoroughly compacted structure, which will not only withstand rough treatment by weather influences. Corrugated asbestos sheets for roofing and siding purposes are made of a uniform width of 27½ inches, comprising eleven complete corrugations, and in lengths of 4, 5, 6, 7, 8, 9 and 10 feet. The corrugations are 2½ inches wide and 1 inch deep from top to bottom of corrugation. The material varies in thickness from $\frac{3}{16}$ to $\frac{5}{16}$ inch and weighs from 2.8 to 3 lbs. per square foot.

The flat form of the asbestos concrete sheets, known as asbestos building lumber, is widely used for both exteriors and interiors, but more extensively for interior construction, where its non-combustible nature, heat and electrical insulating properties and clean, firm surface, give it an almost unlimited range of application. It can readily be sawed, cut, drilled, punched and nailed, which permits of its use in suitable and attractive designs, not only for walls, ceilings, panelling and wainscoting, but also for doors, window frames, closets, screens, pipe and wire conduits, table tops, elevator shaft linings, etc.

Keasbey construction.

The uses of ambler asbestos building materials are very numerous. The incombustible nature and high insulating qualities of the asbestos concrete serve to protect combustible materials on one side against fire and heat on the other. It is, therefore, well adapted for storerooms for combustible materials, moving picture booths, dry kilns, heater rooms, steam boxes, fireplaces, radiation shields around ranges and steam pipes, fireproof bulkheads, doors and shutters, smoke ducts, fireproof and sanitary lockers in schools, manufacturing plants, etc.

Motor Compressor Self Starters, 52 Dickerson St., Newark, N. J. (Booth 238)

At the recent government test, an U. S. Army inspector of aeroplanes reported that a thoro tryout was made with the Model D motor compressor starter of the Hall-Scott A-5 125 H.P. engine with very excellent results. The starter is light, compact, easily warmed, and has an efficiency of over 90%, with long wearing qualities. This company also manufactures a starter of the four cylinder type, the cylinders being arranged 90° apart. This model weighs 39 pounds, complete with a tank, control tubing, etc. weighs 70 pounds. Model D weighs 35 pounds, complete 58 pounds. The weight of both models is considerably reduced when the installation is for twin engines.

Norma Company of America, New York. "Norma" Ball Bearings

The interest of the aviation world in "Norma" Bearings lies in their almost universal use in the magnetos which are known for their dependable service. An aeroplane is no better, in the last analysis, than its engine; its engine is no better than its magneto; its magneto is no better than its bearings. The failure of so small a thing as a magneto bearing may mean disaster to the aeroplane and its operator. Therefore, in the seeking for safety and dependability, it must be significant that "Norma" Bearings are identified with magnetos of proved dependability.

The "Norma" Bearing is pre-eminently a high-speed bearing, owing its superlative speed qualities to several distinctive features, among which are open type, separable construction, rigid mounting of both races, very light ball cage, polar guiding of balls, extremely high precision, utmost refinement of finish and selected materials specially treated.

Its recognized speed qualities have defined the field of application of the "Norma" Bearing as that in which silent, vibrationless, dependable service at high speeds is the first essential. And as this is exactly the service demanded in the ignition apparatus and lighting generators used in the automobile, truck, motor boat, motorcycle and aeroplane fields, it was inevitable that "Norma" Bearings should find their chief application in this electrical accessory field.

An interesting application of this bearing is in the Sperry Gyroscopic Compass. At the two bearings in this sensitive mechanism where the essentials are rigidity and strength combined with utmost freedom of movement, "Norma" Bearings are used because their peculiar design, rigid mounting and extreme precision assure the maximum of anti-friction qualities.

"Norma" Bearings are manufactured by the Norma Company of America, 1700 Broadway, New York City. Originally an imported product, the situation abroad compelled the American company to enlarge its New York factory to meet its orders. And though the company has steadily added to its facilities and has steadily increased its output of American made bearings, in every way equal to the imported product, the production is still behind the demand for these high-precision bearings. Plans are completed for the first unit of a complete factory, to be erected at an early date.

The "Norma" line is not limited to small magneto bearings. It includes also larger ball bearings in all the internationally standardized sizes, as well as roller bearings, thrust bearings and combined radial and thrust bearings. All are distinguished by the characteristic "Norma" precision, silence and serviceability.

Pyrene Mfg. Co., New York. (Booth 217)

Aeroplane equipment has kept pace with the remarkable strides made in the industry recently. To have flames attack his machine in mid-air has been one of the real perils that confronted the aviator but there is now on the market an extinguisher that materially reduces the danger from fire.

It is the one quart pump type such as made by the Pyrene Manufacturing Company of New York.

The manufacturers of the Pyrene extinguisher realized that the aviator could not equip his machine with an ounce of useless weight. A Pyrene when filled and ready for any emergency only weighs six pounds. It is so small that it can be handled from almost any angle and used effectively in cramped quarters.

Robinson-Roders Co., Newark, N. J. (W. H. Robinson, President)

With the view of providing an efficient, light and convenient life preserver, the Robinson-Roders Co., of Newark, N. J., is manufacturing the Universal Ilanasilk aviator's life preserver as designed and patented by Lieut. S. P. Edmonds, U. S. Coast Guard, retired. It is designed to fit persons of any size and to be used with any clothing suitable to the season or service. It is also designed to hold the face of the wearer out of the water in case of being stunned or unconscious from any cause. They are extensively used by government aviators and others and a number of lives have already been saved by their use.

S K F Ball Bearing Co., Hartford, Conn.

The success with which ball bearings are being used in aeroplane construction is due largely to the fact that, when correctly designed and manufactured, they are absolutely reliable. Reliability is the most important quality of every part used in an aeroplane.

To fully appreciate the reliability and usefulness of ball bearings, their mechanical construction and the material from which they are made should be carefully considered. A radial bearing of the type manufactured by the S K F Ball Bearing Company consists of an outer ball race, an inner race, two rows of balls and a ball retainer or spacer. The balls and races are accurately made of highly-tempered Swedish crucible steel, a material admirably qualified to resist wear. The ball spacer, of pressed steel, or bronze (depending upon the type of bearing in which it is used) is made in one piece; there are no screws or rivets to work loose and interfere with the proper action of the bearing.

Reliability is, however, but one of the valuable qualities which ball bearings of the self-aligning type possess. In the inner race of the bearing, definite paths for the balls are formed by grinding two grooves in the outer surface. No definite path is provided for the balls in the outer race; the surface on which they roll is ground so as to form part of the sphere, the center of which always lies on the axis of the shaft. It will be seen that the bearing is really an adaptation of the "ball and socket" principle, although the shaft may deflect, the strain on the bearing is not increased.

A. G. Spalding & Bros., New York City. Aviation Clothing (Booth 311)

The exhibit of aviation clothing by A. G. Spalding & Bros. at Grand Central Palace is one of the strong features of the Aeronautic Exposition. The Spalding exhibit is opposite that of the United States Government, and so far as the sartorial outfitting of airmen is concerned, contains every up-to-date idea for comfort and protection from cold.

The exhibit as it stands is the result of long preparation and thought on the part of A. G. Spalding & Bros. Foreseeing the rapid expansion of aviation and its growing importance in war and peace, the firm began more than two years ago to look seriously into the idea of establishing an aviation clothing equipment department, with headquarters in New York and branches among its stores at important aviation points throughout the United States.

This department now established and in working order, is one of the largest and most complete of its kind in the United States, and no doubt will play a most important part in the future equipment of Army, Navy and civilian "bird men" as the aviation industry develops.

Among the goods in the Spalding booths, one will see the line of aviation hoods, leather safety helmets and aviators' safety device straps and quick release attachment made in one of the Spalding factories.

Long and short leather coats, fleece lined, giving all the protection from cold that it is humanly possible to build into garments form an attractive part of the showing.

Another part of the exhibit are the Army and Navy uniforms and outfits showing what is being worn in Europe by the warring air men. Waders, mechanics' suits, sweaters, and hood sweaters, shirts, gloves, scarves—absolutely every detail in air navigation dress is included, not forgetting that important item of fur-lined goggles, for which Spalding has the exclusive agency in the United States.

These goggles are practically unbreakable and are today in general use by both the aviators of the Allies and Central Powers.

Steel Fabricating Company, Chicago, Ill.

The Stefco ready-made portable sectional steel buildings manufactured by the Steel Fabricating Co. are extensively employed for industrial purposes. The uses to which they are put include warehouses, wagon shelters, contractors, toolhouse, blacksmith or machine shops, dry cleaning departments for laundries, farm buildings, etc.

Stetco buildings, by their simple system of standardized sectional unit construction, enable one to secure and put into actual service, in the shortest possible time, a one-story fireproof building, possessing the vital elements of low cost, ease of erection, strength, rigidity and lasting satisfaction.

The Steel Products Co., Cleveland, O. Valves for Engine Makers. (J. A. Krider, Secretary and Sales Manager)

The principal product furnished by this company in the line of aeroplane parts is motor valves. Valves of all materials are made, and the company is equipped to produce them of any material desired. The company has made a specialty of valves for aeroplane motors and has assisted a large number of designers in arriving at a valve that is satisfactory for the type of motor they are designing. This involves not only a knowledge of these motors and their requirements, but also a wide knowledge of valve materials, and their actions under various motor conditions.

The company not only furnishes valves of regular aeroplane valve materials, such as high tungsten steel and solid nickel steel, but also some special alloy steels it has developed that are suitable for aeroplane work.

The engineering department has co-operated with aeroplane motor builders in making suggestions and working out troubles they have met with in designing motors that will pass specific test requirements and perform satisfactorily in service. The company's work, therefore, is not confined to manufacture alone, but includes advisory service that is the result of pioneering in the field of valve manufacture, and also includes a thorough knowledge of the progress of aeroplane development at the present time.

The Taft-Pierce Manufacturing Co., Woonsocket, Rhode Island. (Louis W. Hubbard, President)

This company makes a specialty of furnishing a high caliber of mechanical engineering service and contract manufacturing.

A feature of their business which will appeal particularly to the readers of this publication is the manufacturing on a contract basis of complete internal combustion motors for aeroplane use and other purposes. They have a completely equipped factory, with ample space and facilities for manufacturing motors in quantities, and furthermore their organization includes a corps of engineers competent to assist in the designing and developing of new ideas in this line. They make a specialty of model building as well.

Another feature of their business is the designing and building of special tools and machinery for the economical production of interchangeable parts.

Radium Chemical Company, Pittsburgh, Pa. (Joseph A. Kelly, President.) (Booth 220.)

The importance to night flying of properly illuminated instruments is seen in the account given in The New York *Times*, by Ruth Law, of her record-making flight from Chicago to New York:

"Soon after I left Hornell, I saw that I was not going to reach New York Sunday. It was getting dark. I was almost tempted to go ahead in the dark to Governor's Island, but I had not any lights to enable me to see the instruments that told where I was going and how."

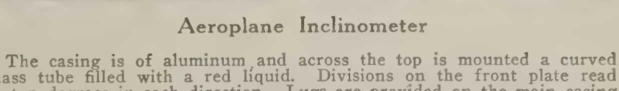
The Aeronautical Department of the United States Government meets this requirement in its specification No. 1002 for aeroplane accessories by the use of Radium Compound No. 6 (Radium Chemical Company, Pittsburgh, Penna.).

A suitable varnish is made by the Radium Chemical Company under the trade name of "Standard Luma Varnish." This varnish drys to a clear, transparent, glossy surface and is resistant to the action of moisture, alcohol and atmospheric influences.

Where contrast and brilliancy are of importance, as on the dials of aeroplane indicators, the best results are obtained by applying on a black or dark background. By applying the luminous paint to white letters, a greater degree of luminosity is obtained than by making the application directly to black surfaces.

Taylor Instrument Companies, Rochester, N. Y. Aviation Inclinometers. (Booth 230)

These inclinometers, are mounted in aluminum frames, and are sensitive and necessary instruments on an aeroplane. They are used, as is known in aviation circles, in measuring the angle of slope of an aircraft, referred to the horizontal.



Aeroplane Inclinometer

The casing is of aluminum and across the top is mounted a curved glass tube filled with a red liquid. Divisions on the front plate read to ten degrees in each direction. Lugs are provided on the main casing so the instrument can be securely fastened to the fuselage. These instruments are usually fitted in pairs, one ahead of and one beside the driver or pilot. Their approximate measurements are: Length, 9½ inches; depth at center, 1$\frac{1}{16}$ inches; width, ¾ inch; approximate weight 6 ounces.

This company also manufactures altitude barometers, etc.

John A. Roebling's Sons' Company, Trenton, N. J. Roebling Aviator Wires and Cables. (Booth 255.)

Practically all aeroplanes of American manufacture use Roebling wire, strand or cord. Owing to the severity of the conditions it is absolutely essential that material of the best quality be used. The grades are known as Standard Aviator Wire (tinned); Roebling 19-Wire Galvanized Aviator Strand, plate No. 3; Roebling 7 x 19 Tinned Aviator Cord, plate No. 5; Roebling extra flexible aviator cord, galvanized, 6 x 7, cotton center, plate No. 13; Roebling flexible aviator cord, galvanized 6 x 7, wire center, plate No. 14.

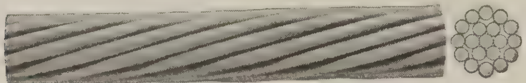
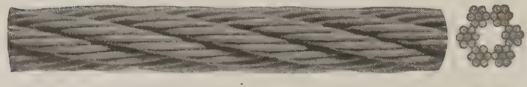


Plate No. 3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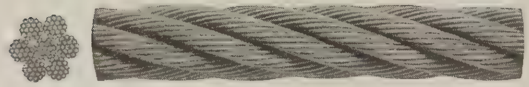
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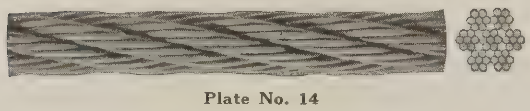


Plate No. 14

Roebling Galvanized Aviator Strand consists of nineteen fine wires of great strength stranded together. On account of its small size the one-thirty-second inch diameter strand is made of seven wires. This strand is not very flexible and is used for stays. It is approximately one and one-third times as elastic as a solid wire of the same material.

Roebling Tinned Aviator Cord is composed of seven strands of nineteen wires each. This wire is made from the highest grade of steel and given a heavy plating of tin. It is used principally for stays on foreign machines. This cord is approximately one and three-quarter times as elastic as a solid wire of the same material.

Roebling Extra Flexible Aviator Cord is composed of six strands of seven galvanized wires each and a cotton center. On account of its flexibility this cord is used for steering gear and controls. This cord is approximately two and one-quarter times as elastic as a solid wire.

Roebling Flexible Aviator Cord is made with seven strands of seven galvanized wires each. This cord is not as flexible as the cotton center cord and is approximately one and three-quarter times as elastic as a solid wire.

The company furnishes interesting tables showing diameter of strand, breaking strength of strand, approximate weight for 100 feet, etc.

The Sechler and Company, 538 East 5th Street, Cincinnati, Ohio. (C. W. Shipley, President.) Manufacturers of Trailmobile.

Above company manufactures the trailmobile for almost illimitable use in transportation from a military standpoint. The company has sold the U. S. Government a kitchen.

The aeroplane carrier has been approved after severe tests and demonstrations by the Signal Corps and adopted by them for the Aviation Section, United States Army. It may be called an "Aeroplane Carrier" or "Aeroplane Ambulance." It will find its use for moving both new aeroplanes from place to place, and in handling aeroplanes which are disabled.

The skids in the rear are removable. The aeroplane is run up on its own wheels and rests in the wheel cradles. The shoe of the aeroplane rests on the bridge in the front of the carrier. The cradles are padded and the wings are placed in the cradles. The engineering feat of carrying practically the entire weight of the aeroplane in the wheel cradles and still retaining a non-vibrating, non-buckling frame, was an achievement, the credit for which rests with the engineering corps and with Mr. Ward Baldwin, C.E. (consulting engineer), for Cincinnati. The frame is carried directly on side springs; in order that the strain and distribution may be properly effected, a sub-frame is clipped to the rear axle and supplemental springs placed front and rear of this supplemental frame.

The wheel base is 22 ft.; the frame over all, 28½ ft. The frame itself, is of heavy channel section, thoroughly gusseted and braced with cross-sections.

The essential features of the Trailmobile in its steering mechanism are in no way disturbed, and the wonderful tracking features of the Trailmobile are shown by the fact that recently, both unloaded and loaded, the Signal Corps hauled this machine through the congested traffic of New York City.

This company does not claim credit for the conception of this method of carrying aeroplanes. It was the fertility of various members of the Aviation Section, Signal Corps, which suggested the idea and afforded us the opportunity of working it out.

The above fact is also very clearly shown in the perfected Trailmobile rolling military kitchen. The great success of rolling kitchens in the foreign armies has led to the extensive studies of this by officers in the United States Government, and tests have been made and are being made on the Border and elsewhere. The kitchen embraces the greatest novelty of design, and meeting the greatest number of requirements is the trailmobile kitchen.

The Trailmobile Kitchen

So-Luminum Manufacturing and Engineering Co., Inc., 1790 Broadway, New York. (George L. Upshur, President.) (Booth at Exposition)

So-Luminum, the new, great welding compound for aluminum, saves parts heretofore scrapped and given up by welders. So-Luminum does work that is impossible for acetylene welding to perform and in one-fourth the time and at one-fourth the cost of acetylene. So-Luminum stands in a class by itself and is the strongest welding or soldering compound ever invented, with great ductility and which stands the "hot water test," besides holding its color. The only thing necessary to work So-Luminum is a gasoline torch, although it can be worked with a gas blower, kerosene torch, or acetylene, if handled carefully. No tools are required, save a piece of flat iron such as a hack saw blade.

The Standard Parts Company, Cleveland, O. (J. C. Manternach, General Manager.) (Booth 259)

Seamless steel tube; seamless steel rims and rings; electric welding.

Standard Screw Company, Corry, Pa.

The Standard Screw Company, Corry, Pennsylvania, specializes in the manufacture of turnbuckles of all sizes and shapes, and they display their full line at the Exposition, in addition to a showing of bolts and nuts manufactured to S. A. E. Design.

Staten Island Aviation School, 119 Lexington Avenue New York City. (G. Grundy, President)

Aerodrome located on Staten Island, with facilities for land and water flying.

United States Rubber Co., New York. (Booths 226-228)

The United States Rubber Company specializes in the manufacture of balloon fabrics and also furnishes the following:

Clothing and shoes for aviators; mechanical sundries for aeroplanes, flying boats, etc.; shock absorbers, gasoline hose, rubber matting, etc.

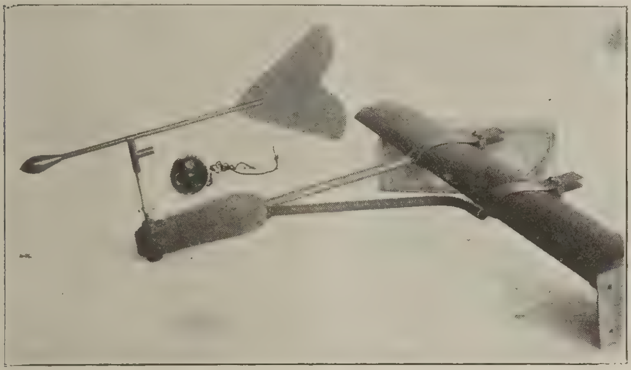
Vacuum Oil Company, New York. (Booths A and B)

The Vacuum Oil Company at the Aeronautical Exposition is showing pictures of aviators who have used, and are using, the Vacuum product. There is also shown a miniature oil farm which has derricks and pipe lines through which the oil is piped to the refinery, showing how the crude oil is handled.

SPERRY EXHIBIT

Scientific aviation accessories, showing the progress made in aerial navigation equipment from the days when an altimeter was the only instrument on a "flying machine" to the present day equipment of automatic pilots, synchronized drift sets, azimuth stabilizers, incidence indicators, etc., found so many aeroplanes are exhibited in the Sperry booth at the first Pan-American aeronautical exposition at the Grand Central Palace.

One impressive feature of this aviation instrument display is the safety these devices assure every pilot under all conditions of aerial navigation. Since the equipment can be installed on any type of aeroplane or seaplane, flying may be made easier and more comfortable as well as safer, for whoever sits in the cockpit with hand on the control levers.



Incidence indicator.

The relief from physical and nervous strains guaranteed a pilot by using up-to-date aparatus is as important as the selection of a modern machine in preference to an old type airplane. Take the Sperry synchronized drift set, for example. By using this instrument an aviator can fly directly to the point of destination regardless of whatever side winds are encountered. Moreover, the correction for velocity and direction of air currents is done without making mathematical calculations.

Some apparatus never before exhibited publicly is being shown at the Sperry booth. This list includes an azimuth stabilizer, stallemometer for warning against stalling; a chart holder, and clinometer, which is used for indicating the fore and aft positions of an aeroplane with reference to the horizontal.

The Automatic Pilot

The Sperry automatic pilot relieves the pilot of the labor and drudgery in operating the controls of his machine. In the military aeroplane it makes it possible for the pilot to fulfill the duties of both pilot and observer. When dropping bombs it enables the pilot to get the aeroplane laterally over the target, makes a reference plane of the aeroplane, which greatly increases the accuracy of bomb dropping, and creates a steady platform from which to fire and drop bombs.

The equipment consists principally of three units—the generator, servo motor and gyro unit—which may be likened respectively to the heart, muscles and brain of the human pilot.

The gyro unit utilizes the gyroscopic effect of the four gyros which it contains in maintaining a horiznotal reference plane. Any departure of the aeroplane from its set relation to this gyroscopic reference plane causes an electrical contact to be made which completes a circuit to one of the magnetic clutches in the servo motor. The power generated in the servo motor air turbine is now transmitted through the engaged clutch to one of the drums over which the control wire passes.

The generator supplies alternating current for driving the gyros and direct current for the servo motor clutches.

By means of a special set of clutches on the gyro unit the operator can set the aeroplane to any position relative to the horizontal which he may desire by pressing a button located conveniently on the manual control and moving his controls as though no automatic pilot were installed on the machine. When the aeroplane reaches the desired altitude, the button is released and control is again given over to the automatic pilot which will hold the machine in that altitude until again altered by the operator.

Complete and unhampered control may be resumed any time by pressing on the push button on the controls.

Synchronized Drift Set

A synchronized drift set makes it possible for any aviator to fly directly to the point of destination regardless of whatever side winds are encountered.

The SPERRY SYNCHRONIZED DRIFT SET enables the aviator to correct for both velocity and direction of all air currents without making mathematical calculations. This is done by turning the drift indicator, comprising a specially designed monocular telescope attached vertically to the cowl, until the hairs crossing the field of vision are parallel with the line of flight. A pointer indicates on a scale the angle of drift in degrees, at the same time the compass' lubber line is moved automatically by means of enclosed cable, the exact amount in the right direction, to correct for any existing drift. For cross-country flying a synchronized drift set is considered indispensable by experienced aviators. The Sperry synchronized drift equipment is specified for all United States Army airplnaes.

Measurements.

Diameter of compass,	6¾ in.
Depth of compass,	3¾ in.
Length of telescope,	9 in.

Incidence Indicator

The transmiter of the SPERRY INCIDENCE INDICATOR is mounted on a forward strut so it does not interfere with any part of the airplane. The light bank or indicator is on the instrument cowl, always being visible to the pilot observing other essential instruments. The red light warns the aviator before he stalls as well as when he begins climbing at a dangerous angle. The white lamp signals whenever the pilot dives at too steep an angle. The green light indicates the best climbing angle. Being of low voltage as well as low current consumption, the lights can be operated on a dry battery, encased in metal and installed wherever most convenient. The signals are regulated by a vane operated by the air stream.

Creagh-Osborne Air Compass

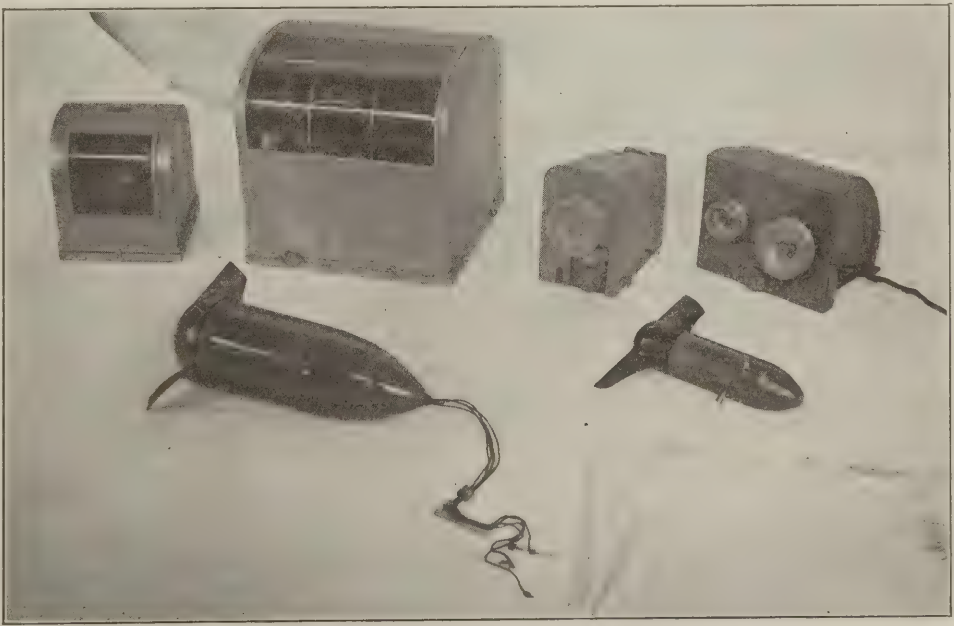
Since it is necessary to know directions definitely when flying, an accurate and durable compass is essential for every aeroplane equipment.

Fulfilling the above demands, the CREAGH-OSBORNE AIR COMPASS was designed to meet the requirements of aviators flying above the battlefields of Europe, where it has proved indispensable. Its lightness, reliability and radium card have rendered this compass invaluable in aeronautic corps connected with the United States Army and Navy. It is equally serviceable for the individual aviator, be he sportsman or exhibition flier. Another feature of this compass is the large heeling angle which eliminates a clumsy and heavy gimbal mounting, so common on marine compasses adapted to aeronautical use. Because of the radium card the Creagh-Osborne compass can be read accurately at night by its own light.

This compass is attached to a wooden base for shipping. If desired, a light metal base is supplied for mounting on the aeroplane. Each instrument is accompanied by a compensating atachment for counteracting all sway magnetic influences and an instruction book.

Measurements:

Diameter of Graduated Card,	3 in.
Diameter of Bowl,	6 in.
Depth of Bowl,	2¾ in.



Units of the Sperry automatic pilot.

STANDARDIZATION OF METAL PARTS FOR AERONAUTIC USE *

F. G. DIFFIN, of the Erie Specialty Company

The subject of standardization of aeroplane parts is a broad one. The growth of the aeronautic industry has been exceedingly rapid and in the immediate future will be tremendous It is my confident belief that its size and importance will rank closely with that of the automobile. It is therefore of paramount importance that immediate and intelligent action be taken by recognized authorities toward the definite standardization of parts. As my aeronautic experience has been entirely in the manufacture of metal parts and fittings, I am confining my remarks to existing conditions and to recommendations toward their permanent betterment.

First, let me enumerate the bulk of troubles now met by parts manufacturers and passed along manyfold to aeroplane manufacturers. Of screw-machine products alone, on a well-known type of machine, there are over 3,000 separate parts. Many of these call for from two or three to as many as ten operations looking to their completion. While the majority of manufacturers run somewhat along the same line in their specifications, we have to-day orders for one specific size of bolt, for practically the same use on various makes of machines, calling for the use of six different metals. We are asked also to make this bolt in over sixty different lengths; practically the same condition exists in eight different diameters. It will thus be seen that should such specifications become general it would be necessary on hex head bolts alone for us to manufacture 2,880 separate items in order to fill aeroplane requirements. It is my belief that fully 75 per cent of these specifications can be eliminated.

An additional bolt complication is the varying thickness of head called for by the different manufactures. There can be only one head that is necessary, that is, the head with the necessary thickness to give a proper factor of safety. Any additional thickness is superfluous and adds materially to wind resistance and weight; while a thinner head is dangerous.

Variety of Parts

We are asked to furnish several hundred different rod and yoke-end pins—in fact, nearly a thousand separate items involving various diameters, lengths, different size of cotter-pin hole, different radii on the nose and different radii and thickneses on the heads.

We are asked to make many different thicknesses of castle nuts, nearly all being for the same purpose. Some call for cold-rolled steel with and without case-hardening and others for nickel steel. Some of these specifications can be eliminated. Machining of nickel-steel castle nuts is one of the most difficult operations we have had to contend with; we are frank to state that we are by no means satisfied with the results obtained so far; and we are not fully confident that entirely satisfactory results can be obtained. The difficulty pertains to the cutting of a true thread.

We are asked to manufacture various other parts, such as eyebolts, shackles, terminals, of various sizes, and other parts too numerous to mention; all to a wide range of specifications. It is obvious, of course, to all men expert in aeronautics that the ultimate uses are the same; it is of vast importance that the various dimensions and varied sizes of these parts be minimized as far as possible and, let me urge, as quickly as possible.

I have enumerated troubles in general from the standpoint of the manufacturer of parts. I will now tell what these mean to the aeroplane and engine manufacturer. With the wide divergence in size, and many kinds of material called for, there are many very small orders for each part, each being urgently needed. In order to secure production for automatic machines, it is absolutely essential that fairly long runs be put on each machine. We have frequently changed our tools on a machine several times a day in order to produce the small number of parts required. The buyer is frequently at a loss to understand why his order for 100 or 1,000 bolts, as the case may be, is so long being filed. Could this wide range of parts be cut down materialy the parts manufacturer would be further warranted in running stock, provided he had any assurance that the size would be in demand in the future. To-day we are uncertain as to what will be required in that future. Such a standardization would be of great benefit to the parts manufacturer and of much greater benefit to the airplane manufacturer.

At a small gathering of aeroplane men a few months ago I was optimistic enough to make the prediction outlined in my opening remarks, but qualified the statement by saying that the number of aeroplanes manufactured would depend on the productive capacity of parts manufacturers. The situation in this regard has become very acute today, but will become more so in the near future. To the average man it seems a simple matter for any parts manufacturer to furnish the aeroplane manufacturer's requirements. We have proved to our own satisfaction that the machining of aeroplane parts is a business by itself, to be taken up in a small way, as then machines can be adjusted to speeds, feeds, etc., for nickel-steel production, and men can be educated in the production of parts to the absolute specifications required. All this takes time. While the company I represent is not a large factor in the manufacture of aeroplane parts, it has taken us over one year to build up a good manufacturing organization, and even if we could obtain the equipment, we would not feel able to double our production, except as we could gradually increase our organization, keeping it in all branches up to necessary efficiency.

The metal fittings now being required in aeroplanes are in the same class as screw-machine products, as many and various types are required. Could these become standardized, the aeroplane manufacturer would find that the cost of many of these parts would be but a small fraction of the present cost.

Probably the most important individual factor in aeroplane manufacture is the turnbuckle. As such it should be treated by itself in a separate paper, since this paper is intended to treat more particularly of such items as bolts, nuts, and rod and yoke-end pins. I will confine further standardization recommendations to these items.

Advantages of Standardization

While many of my criticisms of existing conditions and recommendations for their correction are almost too obvious to require mention, I will nevertheless speak of the more important ones and state in what way standardization will benefit all parts of the industry, and recommend the line of least resistance to follow.

1.—The more important results to be gained from standardization are greater and constant production from parts makers, the result of which is the possible manufacture of a greater number of aeroplanes. This is of particular interest to the Government, against an immediate need for the manufacture of large quantities of machines.

2.—The aeroplane manufacturers will be able to effect large savings in their costs and general operation. They will be required to carry less stock, as the number of parts will be much less, and they will be sure of certain supplies in the quantities needed, and greatly reduced price per item.

3.—The manufacturers will find that in assembling, uniform parts will be of great assistance to them.

4.—The future owners, either Government or individual, of aeroplanes, will be able to obtain readily necessary repair parts.

5.—Of particular interest to the Government, which will purchase various types of machines in the near future, is the fact that standardization of parts will mean interchangeability of parts for the various machines it will use. This will be an important advantage in operating supply depots.

6.—One of the greatest reasons for standardization is this: Unless rigid standards are specified and strictly adhered to by both parts and airplane manufacturers a large element of danger will be introduced. The rush of work incident to manufacturing parts to many different specifications will result in improper use of metals, incorrect heat treatments, etc. The inevitable outcome will be serious accidents in flights, resulting in loss of life and lack of confidence of the public in the stability of airplanes.

The big future of the aeroplane, which we all anticipate, can be secured only by creating in the public mind as much confidence in the safety of flights as now exists in the safety of the automobile.

Specific Recommendations for Standardization

The selection of the particular type of alloy steel is directly controlled by the function for which the member is designed. There would be no direct advantage in using an alloy stell for such parts as washers, sheet metal parts and, in my judgment, nuts.

Designers' specifications must necessarily contemplate both the theoretical considerations and the practical methods of manufacturing. Consideration must be given to the material-producer's point of view in order to avoid an unnecessarily severe specification to accomplish some relatively minor purpose. While, at all times, a high grade of material, far above the average commercial type, is demanded, full regard should be paid to the methods of economical production.

Bolt Dimensions and Materials

Referring now to the subject of bolts, I would recommend:

1.—That lengths be standardized as far as possible.

2.—That needles diameters be eliminated; for instance, there is no practical need of both 3/16 in. and No. 10 bolts.

3.—That material for bolts to be used for certain purposes be clearly specified. One material only is necessary for a given purpose. In the majority of instances to-day 3½ per cent nickel steel with proper heat treatment fills the requirements, with liberal factor of safety.

4.—A certain standard should be fixed for thickness of head. Up to certain diameters, let there be one fixed thickness; above this diameter each head should be a certain fraction of the diameter; all to be determined for necessary strength plus a factor of safety. Of this specific item, the parts manufacturer is asked to make upward of 15,000 separate items. By standardization a large percentage of these items can be eliminated.

Rod and Yoke-End Pins

Referring to rod and yoke-end pins, my recommendation is: limit the number of diameters and length to the fewest possible. Where a cotter-pin hole is required, let this be the same size in all pins of given diameter.

As the head of the rod and yoke-end pin need be no stronger than the cotter-pin, it is necessary that this be of only one definite thickness proportional to its diameter. Different radii on the edges are absolutely useless.

Nut Requirements

We have thoroughly investigated castle nuts, both in our own laboratory and through the testing departments of other manufacturers. We believe, for economical production, accurate production and quantity production, that the use of nickel-steel nuts is no longer necessary. The function of a nut is to bear perfectly upon the threads of the alloy-steel bolts. Satisfactory results can be obtained by using cold-rolled steel of proper carbon content and properly case-hardened.

For a certain diameter of bolts the desired results can be obtained by the use of one thickness of nut only, and the innumerable specifications used today by various manufacturers, as to thickness, radius, etc., should be reduced to the one practical dimension and radius required.

A source of ever-present manufacturing difficulties is in ball-head nuts and bolts, due to the varying radii required. The size of this ball head and nut is necessarily controlled by the function of the member in which they are placed. As at present designed, they have several hundred per cent excess strength.

As the different designs of head and nut, both as to radius and thickness, are many and varied, one radius, one thickness and one diameter in proper proportion to the metal and diameter of the shank are all that is necessary.

Author's Conclusion

These few recommendations are of great importance. If standardization of these parts be immediately undertaken, great benefits will be derived.

As these parts are standardized many others will require the same effort. We all concede the need of standardization and the great results to be obtained from it.

I cannot emphasize too strongly the urgent necessity for the immediate standardization of all aeroplane parts.

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* Paper read at S. A. E. meeting, February 9th.

SUGGESTIONS FOR STANDARD TESTS OF AEROPLANES *

By JNO. J. ROONEY, Wright-Martin Aircraft Corporation

NE of the most serious questions confronting the aeroplane industry at present is: how can performance predictions be made more reliable? The importance of being able to predict the performance of a design, with precision, is brought home to us when we are informed that, during the past year, manufacturers have had considerable difficulty in obtaining with their machines the performance guaranteed to the Government in their contracts. This last feature is in itself serious, because it not only means much expense to the manufacturer but also delay in the delivery of the machines to our Army and Navy, a condition, which, if prevailing during war time, would be a national calamity.

A brief analysis of some of our present methods may throw light on the causes of our trouble and possibly show us a solution of the problem.

PROCEDURE NOW FOLLOWED

The policy of the industry, generally, is to start the development of a new design by doing all the preliminary work in the best approved scientific manner. Laboratory tests are usually conducted with the highest degree of precision and the same scientific thoroughness is carried out in all the engineering work until the actual field testing is done, where carelessness occurs.

It seems that it is the policy of some of the manufacturers to force successful performance regardless of the number of alterations in design required for the accomplishment. It is my opinion that in this particular we are making a grave mistake. The testing field is nearly always located some distance from the factory and the engineering staff; it is therefore impossible for the engineers to supervise all the changes that are made on the field and investigate the resulting difference in performance. Reliable records of engineering value are seldom kept on the field, and as a result the engineers are deceived regarding the performance of the machine: first, because they do not learn the truth about the performance; and, second, because they have no record of the changes that have been made on the machine to make it come up to expectations—changes often important enough to alter radically the original design.

This means that when the next aeroplane is designed the same mistakes are made and the same slip-shod field methods are employed in making corrections that would be incorporated in the design if the engineers had accurate information as to their advisability.

IMPROVEMENT IN MAKING FIELD TESTS

What I have to suggest is that we standardize field tests as much as possible. The automobile engineers have found it necessary in the development of their engines to have a complete record of all the changes they make in design and the effect they have on the engine's performance. As a result, they can predict with a high degree of accuracy the result of this or that change. In order to facilitate the recording they have evolved standard forms that contain all the important data they desire to record. Since they have already accomplished much by these methods, and since we are striving to do the same, we should profit by their experience and conduct our tests in the same scientific manner.

STANDARD TEST FORMS

Outlines of forms for aeroplane (I), engine (II) and propeller (III) specifications and for recording aeroplane (IV) performance data are given. The specifications should be separated, as shown, to eliminate the necessity of having to rewrite the complete set in case only one of the units is changed.

It would seem that the sheet proposed for the S. A. E. Engine Testing Forms would be satisfactory for giving the engine specifications. This sheet and the accompanying directions are therefore reproduced. Form IV is the proposed test form. I have endeavored in this form to include all the important observations we can obtain with our present instruments.

I—Suggested Form for Aeroplane Specifications

Manufacturer ....
Model ....Serial No....................
Side Elevation—Drawing No. ....
Front Elevation—Drawing No. ....
Plan—Drawing No. ....

Type

Tractor or Pusher ....
Land or Water ....
Planes, No. ....
Planes (Position) ....
Engines, No. ....
Propellers, No. ....
Engines (Position) ....
Propellers (Position) ....
Body (Kind) ....
Landing Gear (Kind) ....

Areas

Upper Wing (Excl. Ailerons)..............................sq. ft.
Middle Wing (Excl. Ailerons)..............................sq. ft.
Lower Wing (Excl. Ailerons)..............................sq. ft.
Ailerons ....sq. ft. each....................sq. ft.
Total Supporting Surface ....sq. ft.
Rudder ....sq. ft.
Tail ....sq. ft.
Fin ....sq. ft.
Elevator ....sq. ft.
Skid Plane ....sq. ft.

Weights

Dead Weight ....lb.
Useful load:
    Pilot ....
    Passenger ....
    ......hr, fuel at..............lb. per b. hp. hr................lb.
    ......hr. oil at..............lb. per b. hp. hr................lb.
    Other weights ....lb.
....
Gross Load ....lb.
Load per sq. ft. of supporting surface..............................lb.
Load per b. hp. of engines..............................lb.

Design of Wings

Quantity	Upper	Middle	Lower
Aerofoil	....	....	....
Mean Span, ft.	....	....	....
Mean Chord, ft.	....	....	....
Dihedral Angle, deg.	....	....	....
Angle to Engine Shaft, Deg.	....	....	....
Area, sq. ft.	....	....	....
Spars, No.	....	....	....
Sweepback, degrees	....	....	....
Stagger, % of Chord	....	....	....
Mean Aspect Ratio	....	....	....
Gap to Chord Ratio	....	....	....
Rake, deg.	....	....	....

Body

Type ....
....
Length from Nose to Stern Post..............................ft.
Breadth (Max.) ....ft.
Depth (Max.) ....ft.
Stern (Vertical or Horizontal) ....
Weight (Bare) ....lb.
If Boat:
    Displacement ....cu. ft.
    Planeing Area ....sq. ft.

Landing Gear

Type ....
....
Wheels or Floats, No. ....
Gage ....ft.
Wheels ....in. dia....................in. width
Floats ....ft. max. length..............ft. max. width
Float Displacement ....cu. ft.
Struts, No. ....Kind....................
Wing Float, Size............ft. max. length............ft. max. width
    Weight ....lb.
    Displacement ....cu. ft.
Tail Float, Size............ft. max. length............ft. max. width
    Weight ....lb.
    Displacement ....cu. ft.

Controls

Type ....
Angle of Tail Plane to Engine Shaft ....deg.
Ailerons, No. ....
    Position ....
Rudders, No. ....
    Position ....

Center of Gravity

Horizontal Coordinate Measured from ....in.
Vertical Coordinate Measured from ....in.

(For engine testing the author has adopted the S. A. E. engine test forms, which are not reproduced here through lack of space.—*Editor.*)

III—Suggested Form for Propeller Specifications

Manufacturer ....
Serial No. ....Dwg. No. ....
Blades, No. ....
Diameter ....ft. in.
Material ....
Laminations, No. of ....
    Type (continuous or spliced)..............................
Sheath, kind ....
    Weight ....lb.
    Length ....in.
Method of Securing to Blade..............................
Propeller weight ....lb.
Hub Diameter............in.; Distance between Flanges..........in.
Bolts, No. ....Dia.........in.; Radius of Bolt Circle.........in.
Designed for...........hp. at...........r.p.m. and............m.p.h.
Theoretical Thrust ....lb.
Theoretical Power Required ....h.p.
Theoretical Efficiency ....per cent

Section Characteristics

Radius, in.	12	18	24	30	36	42	48	59	60
Angle of Attack, deg...	....	....	....	....	....	....	....	....	....
Pitch, in.	....	....	....	....	....	....	....	....	....
Aerofoil	....	....	....	....	....	....	....	....	....
Chord Length, in.	....	....	....	....	....	....	....	....	....

IV—Suggested Form for Recording Test Data

..........Test of Model..........Aeroplane No....................
Manufactured by ....
Test made for ....at............o'clock
..........................19...., on.......Field.........U. S. A.

Dimensions and Description

Length of Course, miles: circular..............straight..............
*Total Weight of aeroplane and load on Test......................lb.
Useful load: men..................lb.; fuel..................lb.;
    oil..................lb.; other weights............lb.

Engine

Manufacturer ....
Model ....Serial Nos.: Right..........Left..........

Propeller

Manufacturer ....
Dwg. No. ....Serial Nos.: Right..........Left..........
Remarks ....
....
....
....

VALUE OF FLIGHT REPORTS

The forms outlined are primarily for the manufacturer's use on the test field, but at the same time they should also be used on all aviation fields, especially on those belonging to the Government. The owners of aviation fields are in a position to collect much valuable engineering data and we should solicit their cooperation. By a little effort on the part of the testers at such fields the manufacturers can be furnished with reports on the performance of particular models under all kinds of conditions. Our sad experience in Mexico last summer is enough to show the importance of knowing the conditions under which machines are to be flown. We should have reliable data on the climate and soil of every section of the United States, as these two conditions may at some time completely determine the design.

At present performance tests cannot be conducted as scientifically as we hope they will be in the future, owing to lack of proper instruments. The present instruments are nearly all non-recording, and are usually separate, which means that simultaneous readings are impossible. In some work, particularly in propeller designing, it is necessary to know simultaneously the velocity of advance, the revolutions per minute and the power absorbed. If correct values of these quantities are not known propeller designing is mere guess work.

An ideal arangement of the instruments would be to mount them ni one case and have one clock operate a recording device. In such a combinitaon is not practical we should at least to develop a second ing airspeed indicator and tachometer, if for nothing more than to check our propeller computations.

AUTHOR'S CONCLUSIONS

Performance predictions can be made more reliable by satisfactorily checking our laboratory experiments with actual fitld tests. Whether we use the plan outlined above, or some other to furnish that check, let us by all means increase the value of our field tests.

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* Paper read at S. A. E. meeting, February 9th.

THE EVOLUTION OF AEROPLANE WING-TRUSSING*

By F. W. PAWLOWSKI

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It is hard for an inventor or designer to break away from the forms, types or examples already existing in nature; the first efforts to build a flying machine were therefore attempts to imitate the flapping of birds' wings, just as there were attempts to build locomotives that moved on legs.

We know how the aeroplane was finally created. It is not a replica of a bird; does not imitate the bird-motions in flight (except to a certain extent in gliding flight), but it still retains the essentials of a bird's wing, modified and immovable.

The problem faced by our predecessors was to build wings large enough for a man-carrying glider or aeroplane and was an extremely difficult one. They had to answer these questions: How was the big wing surface to be made of light weight and rigid at the same time? How were the members of the wing framing to be arranged?

Monoplane Wing-Trussing

The examples furnished by nature in the wings of insects, birds and bats, already adopted for the construction of the umbrella, imposed themselves so strongly upon the minds of inventors that it is no wonder we find their application in the early flying-machine, and even in Lilienthal's (1896) and Pilcher's (1899) gliders, Fig. 1, and Ader's aeroplane (1897).

The fact that Henson at the early date of 1842 adopted the Fink truss for his construction must be considered and recognized as extraordinary. High credit must be given his power of mind and constructive ability. The Henson wing construction contains all the essential elements of the modern aeroplane wing, such as front and rear spars, and main and secondary ribs. The reduction of the number of exposed wires as compared with the umbrella type was considerable, and it is really surprising that Lilienthal, Pilcher and others did not adopt Henson's construction. Much later (1909) Levavasseur adopted it almost without change for his Antoinette monoplane (Fig. 2). (In this as in most of the following figures, all the so-called lifting wires are shown by full lines and the so-called landing wires by dotted lines.)

Several other designers of recent date adopted Henson's construction also, as it has the advantage of keeping the wings rigid even after they are detatched from the body.

Although, in the meantime, the biplane wing became more prominent, we will proceed with the evolution of the monoplane wing. In 1910, Blériot adopted the Pratt truss, already popular in biplane construction, for his monoplane, which was of considerable span (Fig. 3). He evidently resigned voluntarily the possibility of almost doubling the wing area without much increase of resistance to motion.

Just a slightly different construction has survived until the present time in the German Taube (Fig. 4). The standard type of monoplane rapidly became the most popular on account of its simplicity of construction and ease of adjustment (Figs. 5 and 6).

The use of four pair of lifting and landing wires on each wing, as in Deperdussin's seaplane, seems to be an unnecessary introduction of too much structural resistance. Two pair of wires (Fig. 6) are the best, and are sufficient even for large-span machines; one pair of wires is sufficient for small-span racing machines An example is the Ponier machine, which competed so splendidly for the 1913 Gordon Bennett Cup.

It is worth while to notice that in 1900 this type of wing trussing was used by Kress for his flying-boat, which was of a triple-tandem monoplane type, before any other machine flew. The interesting thing about it is that Kress was not an engineer but a tailor.

The resistance of the wires is a considerable item in the total structural resistance, so that Blanc in France actually built (1913) a monoplane with cantilever wings (Fig. 7), a rather risky construction considering the wing area used.

Biplane Wing-Trussing

The difficulty of building large wing surfaces was realized as far back as 1866 by Wenham in England. He built a sort of multiplane kite, while Stringfellow in 1868 produced a triplane model, which unfortunately did not fly. But in spite of the remarkable example of Stringfellow, such prominent mechanical engineers as Sir Hiram Maxim (1888) with his huge multiplane, and Lilienthal (1896) with one of his biplanes, could not produce a simple and statically clear structure to combine the planes of their machines. A bridge engineer was the first to do so, and it was Octave Chanute who put the bridge truss in the biplane. Of course, it could be the Pratt truss only. The idea was adopted immediately by all aeroplane builders. As few of them were closely familiar with the principles of frame structures, there was some abuse of the "struts and wires" so that many biplanes of the early part of the modern era of aviation resembled closely the wire entanglement for field fortifications; this is shown in Fig. 8, in which the dotted lines represent the diagonals that were ultimately omitted.

The type shown in Fig. 9 soon became standard and prevails at the present time, the number of panels on each side varying from two to four in various constructions. Panels of equal dimensions, Fig. 9, are justifiable for bridge trusses, but are not the best for aeroplane trusses. By varying the width of panels, as shown in Fig. 10, the structure can be made of lighter weight or for the same weight, stronger.

The forces acting in the spars increase from wing top toward the body; it is advisable, therefore, to decrease the bending or buckling length of the spar stations. Also, for the struts and wires the arrangement in Fig. 10 is more advantageous as the forces acting will be more uniform; that is, the extreme struts and wires are loaded more than those in Fig. 9. The members close to the body are loaded less, thus rendering the dimensions of these members more uniform. This advantage of the *variable-panel truss* is not yet fully appreciated, although the arrangement appeared in France five or six years ago.

Then came the *overhang-type biplane,* with its well-known mechanical and aerodynamical advantages. It was introduced by Henry Farman but had already been incorporated in the remarkable triplane model of Stringfellow. It is inconceivable, however, that Stringfellow had the same reasons for using overhang as had Farman.

The overhang is treated either with *landing-wire bracing,* Fig. 11, or *landing strut,* Fig. 12, the latter arrangement being more advantageous as it offers less resistance to motion.

The resistance of struts and wires is a considerable part of the total structural resistance and the tendency to minimize the number of such members is therefore justified. An extreme example is one of the Bréguet aeroplanes, which had one panel 10.5 feet long on each side of the body, in a machine of 40-ft. span, thus leaving about 8 feet of free overhang on the upper wing (Fig. 13).

A more radical departure from the typical Pratt truss is displayed by the Henry Farman half-and-half monoplane and biplane machine (Fig. 14). The span of the upper wing is three times greater than that of the lower, so that the aeroplane is really a biplane (the central part) with two monoplane wings attached at the tips of the upper biplane wing. These machines are still in use in the present war.

The Ponier-Pagny biplane truss (Fig. 15) with equilateral triangles formed by struts and landing wires is a modification of the Pratt truss, as its essential members are the long diagonals of the rhomboidal panels.

Forms of Wireless Trusses

The real triangular bridge truss was introduced by the Albatross company in Germany about four years ago. The two examples shown in Figs. 16 and 17 are known as wireless trusses.

The advantage is based on the considerable difference between the resistance coefficient of struts with stream-line sections and of wires or cables, the ratio or coefficient being about one to ten. As the thickness of struts is about ten times greater than the wire diameter, the elimination of landing wires by substituting for the lifting wires members that will transmit forces in compression as well as in tension offers interesting possibilities.

As a matter of fact, the total length of all web members of a wireless truss can easily be made much less than one-half the total length of all wires and struts of the usual truss, so that the resistance of the web members can be reduced almost one-half with a small increase of weight.

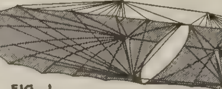
FIG. 1

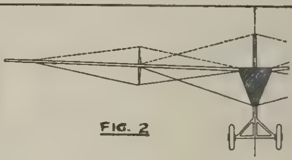
FIG. 2

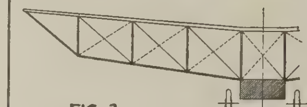
FIG. 3

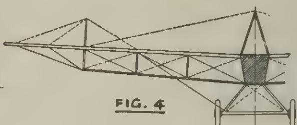
FIG. 4

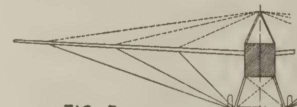
FIG. 5

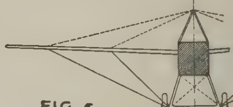
FIG. 6

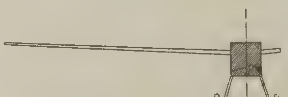
FIG. 7

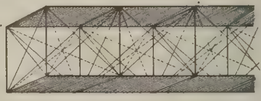
FIG. 8

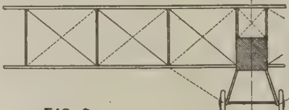
FIG. 9

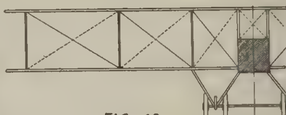
FIG. 10

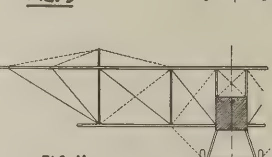
FIG. 11

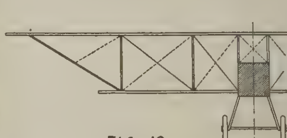
FIG. 12

With this construction it is difficult to connect the wooden struts to the sockets so as to transmit safely considerable forces in tension; it is also difficult to rectify the structure after it warps. When the wooden spars and struts are eliminated, turnbuckles and other adjusting devices are entirely unnecessary; also the difficulty of transmitting forces in tension is avoided, so it is curious why the wireless truss is not popular.

Just recently the Curtiss company has produced an interesting type of wireless truss (Fig. 18), in which the number and length of the exposed members is minimized. The construction is especially adapted to the fast small-span racing or scouting machines.

It is possible to imagine a *strutless truss* as a combination of two pairs of monoplane wings with the usual bracing (Fig. 19), but the total length of wires is considerable, so that the advantages of such a construction would be doubtful. Another form of strutless truss (Fig. 20) is much more promising and with the appearance on the market of wires having stream-line sections, it is possible that the structural resistance can be reduced even further than is the case with the wireless truss. Fig. 21 shows that this construction can be also well adapted for the overhang biplane.

Examples of Triplane Trusses

There were and there are few triplanes. The trusses can be treated here along the same principles as the biplane truss. I mention the triplane because in several instances the problem has been treated incorrectly, as shown in Fig. 22, in which the full height of the truss is not utilized, although it would increase the strength of the truss about four times. Figs. 23 and 24 shows examples of correct treatment. The triplane has a mechanical advantage of decreasing the buckling length of struts by half, which makes them relatively several times stronger.

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* Paper presented at the S. A. E. meeting, February 9th.

Fig. 25 shows a more complicated case of biplane truss for large high-power machines. The more uniform distribution of masses along the truss makes it lighter and stronger. (I omit entirely the question of dynamical stability involved in spreading out the masses in this case.) Here also different solutions are possible. In the Sikorski method the engines *M* are placed on top of the lower wing, close to the inner side of the struts. In the French method the engines are put between pairs of straight struts (see the full lines only). In the Curtiss method the engines are fixed between some special crooked struts (see the dotted lines). Each method has some small advantages and disadvantages, which can easily be seen from the figure.

SIDE-BRACING OF AEROPLANES

Until now we have considered only the aeroplane wing-truss as viewed from the front, or the so-called *lift-truss*. Inside the wings, however, are placed the so-called *drift-trusses*. Both the lift and the drift-trusses are combined to form a rigid three-dimensional structure by means of bracing in planes passing through the struts and parallel to the plane of symmetry of the whole machine. This bracing is visible in the side-view of the aeroplane and I will call it *side-bracing*.

Side-Bracing of Monoplane Wings

The subject of side-bracing of monoplane wings does not offer anything of remarkable interest. Usually each wing has two parallel or slightly converging spars—the front and the rear spar. Each pair of spars, together with some central pylon or the landing chassis, taken as king post, form the front and the rear lift-trusses. Both are fixed in case of aileron control, and the front-truss is fixed and the rear one movable in case of warping. A monoplane has usually a *double lift-trussing;* the spars are at the same time members of both the lift and drift-trusses.

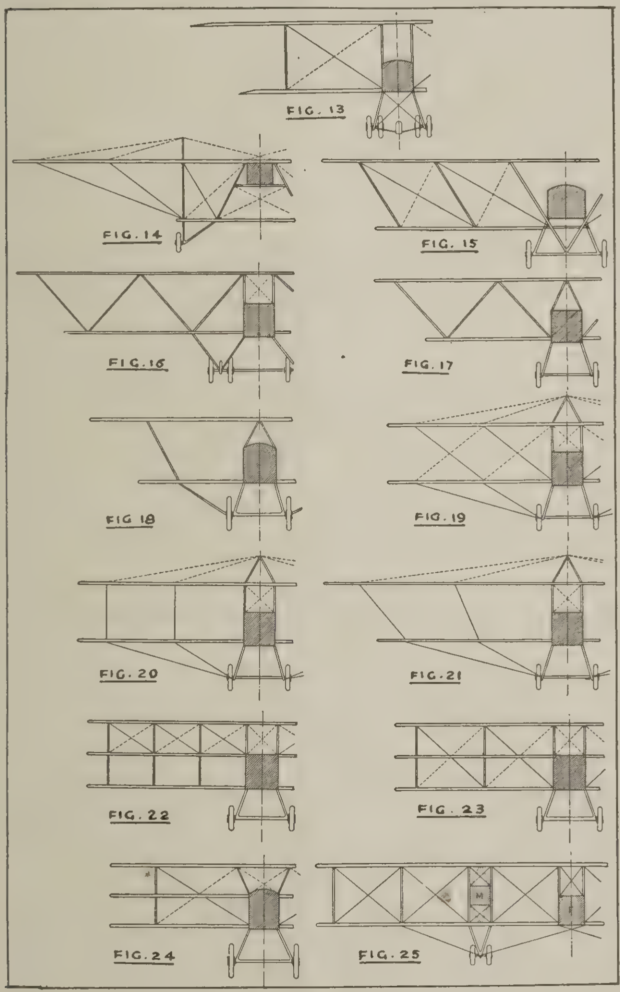


Fig. 26 shows the side-bracing of the Blériot monoplane-bus, on which the rear spar is braced to the lower girder of the *single lift-truss.* This arrangement is more advantageous than the one on the early type of Etrich-Taube (Fig. 27), because the separate lift and drift-truss (requiring three spars) is uneconomical from the mechanical point of view and the two wires offer about twice as much resistance as the single-strut brace in Blériot's construction. The recent type of Taube has side-bracing similar to that shown in Fig. 26.

Side-Bracing of Biplane Wings

The side-bracing of biplane wings offers many possibilities of design. The most common types, Figs. 28 and 29, are based on the same principle, but are adapted to the so-called straight and staggered biplane respectively.

The terms "lift-truss" and "drift-truss," although conventional, are not quite correct. None of the trusses takes care of lift or drift alone. Really, the resultant air-reaction upon the wings resolved into components parallel to the planes of the lift and drift-trusses gives the external forces acting on the trusses.

These components differ considerably from the drift and lift, not only in case of a staggered biplane, but also in a straight biplane, in which, for instance, at slow flight and large angle of incidence the forces acting on the drift-truss are frequently opposite in direction to the drift.

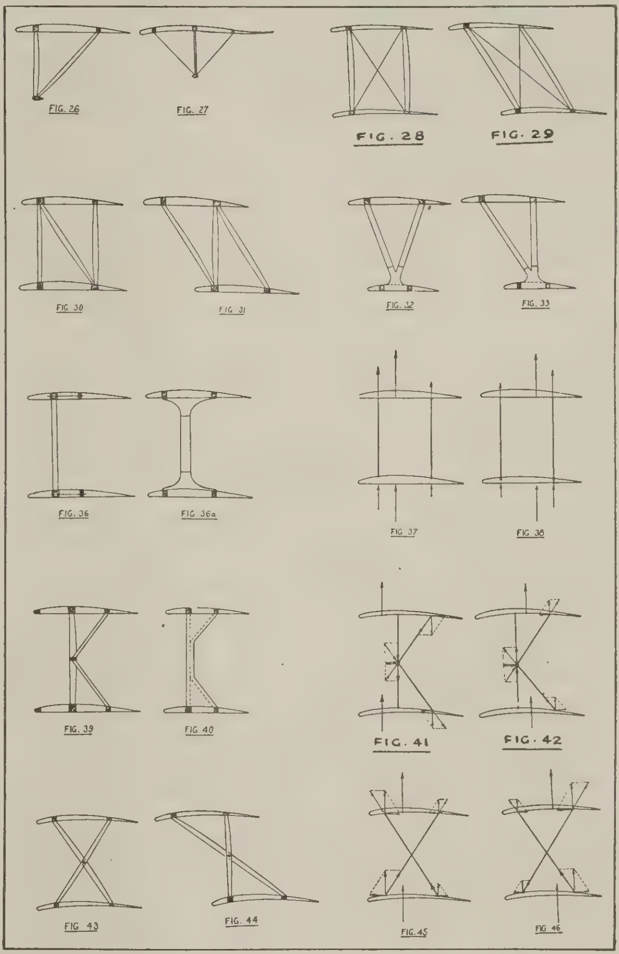
Figs. 30 and 31 show the *N-type side-bracing,* with which again the resistance of the wires of the ordinary bracing (Figs. 28 and 29) can be decreased by half. This bracing, especially when combined with the wireless lift-truss (Figs. 16 and 17) offers new and interesting possibilities for heavy large-span aeroplanes. It was applied by the Albatross company in the form of a triple lift-truss, which seems to be an unnecessary complication, as simpler combinations are possible.

Fig. 33 shows the *V-type* side-bracing, found in the modern Nieuport scouts. The two converging struts are fixed in a special socket fitted between the spars of the lower wing. This construction is also adaptable to straight biplanes (Fig. 32) but in both cases is especially good for an unequal-chord biplane. Although the trussing in the Nieuport machine is treated as of the double lift type, there is no reason why it (preferably the rear one) could not be treated as a single lift-truss with front struts acting as braces.

Development of Single Lift-Truss

The first single lift-truss was used in one of the first Chanute gliders, which was a quintuplane. Chanute, however, did not seem to appreciate the advantages of the single lift-truss system, as he adopted the double lift-truss for his subsequent machines.

It was Bréguet who (1909) produced and advocated the single lift-truss biplane, his main object, however, being to vary automatically the angle of incidence of the wings, which were hinged to the steel tubular spars (Fig. 36).



A more perfect and elegant construction of the single lift-truss, which can be called *I-type* side-bracing, or simply *I-strut,* was used in Dorner's flying boat (1913). The struts were fixed in sockets having long bases that reached from the front spar to the rear spar and were fixed to the latter. An almost identical construction was adopted in 1914 for the R. A. F. fast scouting machine. Mechanically, the front and rear parts of the socket bases can be considered as a cantilever subject to bending, accordingly as the center of pressure moves forward of or past the center of the strut. The struts are thus subject not only to compression but also to bending. The bending moments, however, in the average-size machine are comparatively small and can easily be taken care of by the sockets as well as by the struts. In the latter case it is the maximum moment of inertia of the strut-section that comes into play, and the fibers of material affected are almost idle when buckling occurs. Geometricaly and aerodynamically the sockets can be treated as a well-filled intersection of a strut of stream-line section with half of a stream-line body, thus offering little resistance to motion.

Advantages of Single Lift-Truss

The disadvantage of the single lift-truss system against the double lift-truss is that it cannot be adopted for staggered biplanes, especially those with a pronounced stagger. The advantages, however, are great and can be demonstrated as follows:

1. The strength of the struts varies as the moment of inertia of the strut section.

(*Continued on page* 621)

CONSTRUCTION and OPERATION OF KITE BALLOONS

By RALPH H. UPSON

It is a fact, acknowledged by the military authorities of the warring nations, that no other single factor is so powerful in the war as the effectiveness of the combination of artillery aided by aeroplanes and kite balloons. The daily reports of the military authorities contain brief mentions of the extraordinary work done by artillery aided by aircraft, and the one aim of both sides at present is to attempt to destroy the air auxiliaries of the enemy's artillery.

Correspondents who visit the different battle fronts tell of seeing as many as forty kite balloons within their range of vision at a single period. The kite balloons are the eyes of the artillery, the observation posts, which, located a few miles in the rear of the fighting lines, enable the observers to sweep the extended horizon and watch the fleet of artillery fire and the movements of the enemy, thereafter transferring the information to their field batteries.

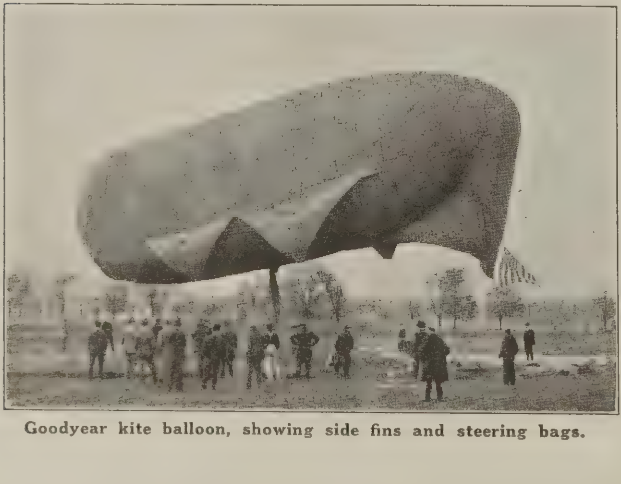
A few days ago, in a report of his visit to the front, Mr. H. G. Wells in analyzing the factors, said: "I visited some French guns during the tir de demolition phase. I counted nine aeroplanes and twenty-six kite balloons in the air at the same time. There was nothing German visible in the air at all." The United States Army and Navy have at present only one kite balloon in commission and half a dozen ordered. There are seventy-three forts and forty-five field artillery batteries in connection with our land and coast defenses and fifteen naval districts of the entire fleet to be equipped with kite balloons. In other words, hundreds of millions of dollars' worth of defenses are blind, as it were, owing to the lack of aerial eyes, so that the territory which they should protect, would be at the mercy of the long range guns, of vessels lying beyond the point of vision of the artillery observers stationed in the forts of the fleet.

As so little is known in this country about the operation and use of kite balloons, the articles which Aerial Age *has arranged to publish will disseminate information concerning the operation and value of kite balloons which will be of great usefulness to our military service.*—[Editor.]

Inspection and Repair

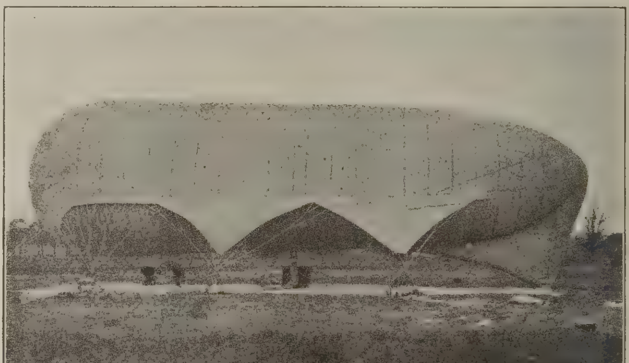
1. *ROPES:* *All* ropes must be systematically inspected *every day* of actual use and worn parts replaced. When the main cable starts to wear, it may be kept in use by reversing, end for end.

2. *LEAKAGE:* It should not be necessary to replenish the gas to the extent of more than 300 cu. ft. per day average when new, or 600 cu. ft. per day at any time. If the leakage exceeds this (with proper allowance for temperature change and valve operation) the first thing to examine is the valve and its connections. See that it seats absolutely tight and is set to open at the proper time. Examine the staffing boxes, the appendix, man hole and valve gland, which may also be sources of serious leakage if not properly secured. *One hole 1/16" in diameter will let out more gas than escapes by diffusion through the entire fabric of the balloon.* The greatest care must also be taken to prevent air getting in. Gas can always be replaced, but the only way to get air *out* is to deflate. With good management this should not be necessary for at least two months.



Goodyear kite balloon, showing side fins and steering bags.

3. *GAS REPLENISHMENT:* This should be done at some regular time every day. Economy in gas is largely dependent on the judgment that is used in putting it in. There is rarely any need of filling the balloon full on the ground. Allow about 1,000 cu. ft. of air in the ballonet for each 1,000 ft. of altitude to be attained. (The total capacity of the ballonet is 5,000 cu. ft.) An allowance for expansion from the heat can be made if the gas is put in during the night, (maximum 2,000 cu. ft. of air). A small cord running down through the ballonet serves as an air gauge. This should be calibrated for some particular set of conditions.



Kite balloon, showing method of inflation.

4. *FABRIC:* The balloon fabric should be examined frequently and carefully for holes and deep scratches, especially where it comes in contact with the ground and where the ropes are liable to rub. If any are discovered, cut a patch to fit, wash both surfaces with gasoline on a cloth. Apply two light coats of cement (C35 Tire Cement will do if there is no balloon cement available) both to the balloon and to the patch, allow each to dry about five minutes, press down the patch and roll it down hard against some hard smooth sur-

face. Especial care should be taken to make the edges tight. To detect pin holes and other small leaks inflate about one quarter full of air and get inside. Examine the fabric, block by block; by this means small holes are readily seen against the light. This should be done after every deflation.

5. *TO REINSERT THE RIP-PANEL:* Get two quarts of Goodyear Balloon Cement. Clean the old cement off of the edges with gasoline. Allow the surface to dry, then apply a coat of cement to each surface with a brush. Allow to dry five minutes and apply another coat. Let dry for five minutes more before sticking together. During the process keep the cemented surface out of the wind and sun as much as possible. Start at the bottom of the panel and work up toward the top along one side, being careful not to scratch the top edge out of place. Roll down hard. The other side of the panel in the same way. Dry the panel at the top and see that it pulls off properly. Cement up tight again. When finished there should be a 2½" lap cemented all around the panel, except for the extreme end, where it is a little wider and brought up to a blunt point about 1" below the stick. Cover the seams on the outside with two coats of cement 1¾" wide. Lay down our specially prepared taping over this and roll it down hard. Allow to stand for several hours before rolling up.

6. *TO CLEAN:* If any oil gets on the surface rub at once with gasoline. Ordinary dirt may be removed with water. If it is wished to paint the balloon, a special paint must be used, which will not injure the rubber.

Packing Up and Carrying

1. *DEFLATION:* Pull gas manhole wide open and let the balloon rise slightly at the rear. Any small quantity of gas that is trapped at the front can be let out through the valve. (Never use the rip-panel except in an emergency.) Open the air manhole as soon as it gets within reach. After the air is expelled there may be a residue of gas against the ballonet diaphragm at the rear. This may be worked back through the air manhole. *Be very careful to see that it is securely closed again before leaving.*

2. *FOLDING:* Remove the valve carefully and put it away. Tie the valve cords to the loop inside. Be careful that there is nothing on the balloon that will cut the fabric. If the rip-panel has been used, pull off the old tape from the edge before folding. Lay balloon with the rip-panel up. Pull the bottom fabric smooth so that both sides of the suspension are near the outer edge. See that the air funnel is laid flat and as far toward the front as possible. Grasp the balloon at each side and fold one-third of the way across. This will bring the suspension patches on top and all loose ropes can be pulled over onto the top of the balloon.

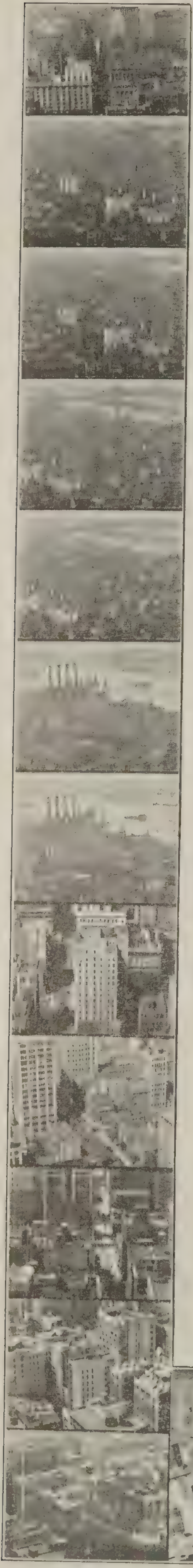
3. *STOWAGE:* Be sure the fabric and cordage is dry before packing. Keep covered in a dark room or den of moderate temperature. *Sunlight has a destructive influence and the balloon should not be left in the sun any more than necessary.*

French gun on the Somme, and two of its "spotting" kite balloons.

4. *TO FOLD PARACHUTE:* Place the top ring of parachute as smoothly as possible in the bottom of the case. Pass a light breakable cord directly across the top of this ring, from one side of the case to the other, so that it will hold the ring from coming out and also from twisting. Hang the case up by its handle from some high point, if possible so the entire fabric of parachute will hang clear. Pull all the opening parachutes free, pull all the ropes into the center and the fabric in pleats to the outside. Place a piece of light cardboard in between the ropes at a point about two feet below the bottom of the cloth. This cardboard is notched at the edge to receive the ropes and serves to keep them from getting tangled together. Now starting at the top of the parachute pull it down evenly on all sides, and tie it every six feet with a short piece of cord. When you get down within six feet of the bottom bring the small opening parachute up to the outside and tie another cord around near the top the the opening parachute.

(*To be continued.*)

Rear view of steering bag of Goodyear kite balloon.



An Aeroplane Camera

OF usual interest to followers of aeronautics and members of the Club is the camera which Capt. Ernest C. Bass, Hydro-aeroplane Pilot number 9 of the Aero Club of America is demonstrating in connection with his activities in flying in this country. The camera, examples of the work of which appears on this page, is not a "movie," although the pictures it takes are on a moving picture film. It is put out by Messrs. Herbert and Huesgen, of New York, and it is so designed that nearly any number of pictures may be taken at the rate of one per second and up, and objects over three miles distant are clearly seen. The idea of the device is to enlarge the pictures and in this way details of great importance from a military point of view are easily discernible.

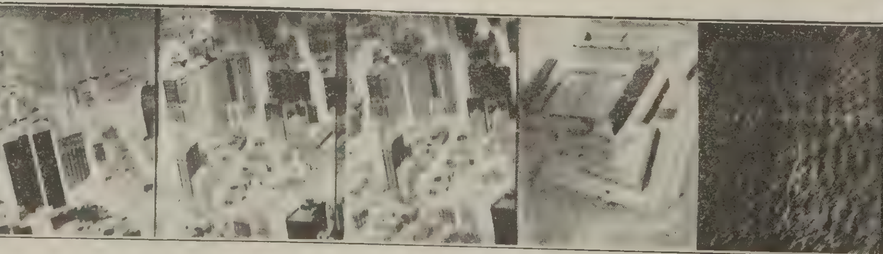
Capt. E. C. Bass

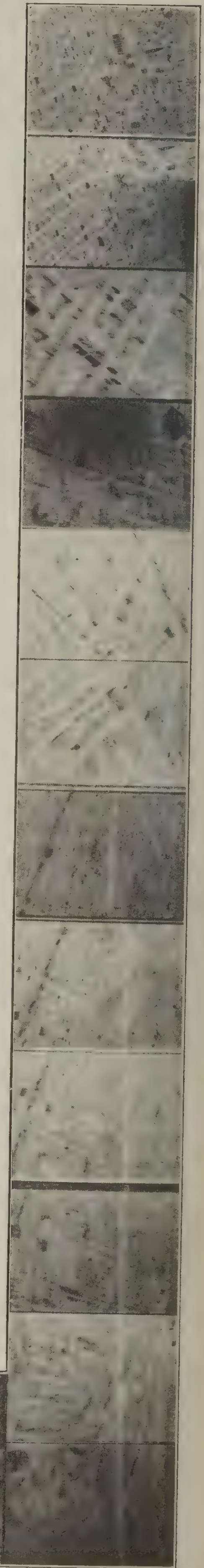
The official name of the camera is the "Multiple Aeroplane Camera," and it has been demonstrated by Captain Bass in numerous flying experiments for the allied nations now at war.

The pictures shown in the series are taken while flying in a machine over New York City and the Governors' Island Aviation Camp, with a special telephoto lens. They are taken while flying over downtown New York, at full speed, some 3,500 feet in the air. Objects three miles distant are easily discernible. The purpose is to enlarge the pictures on a screen in a dark room, by a special projector 8 feet square, when the most wonderful detail is noted of great strategic value.

The camera is operated simply by pulling a cord which makes the exposure, changes the film and set shutters for the next picture in the winking of an eye.

The camera is on exhibition at the Herbert & Huesgen booth at the Aeronautic Exposition.





THE TRAINING OF AIRMEN*

By J. G. GILPATRIC

ALMOST every one has seen an aeroplane in flight, but with the present-day layman, the interest is centered more on the airman than on the machine with which he does his flying. Naturally, the first question is, "How did he learn to fly?"

Of necessity, the pioneers of aviation taught themselves the then difficult and dangerous art, and all the airmen in the world today owe their flying ability to the Wrights, Blériot, and others of the men who went before. There are flying today a number of airmen who entered the game in the early stages, and who by luck and perseverance, mastered the art with very little outside assistance. These men were without more than a rudimentary idea of the very principles of flight, and later realized the dangers they had undergone; they knew that the average person could scarcely survive a self-administered course in airmanship. Aviation had come to stay, and a number of firms started regular schools in which the knowledge of the earlier experimenters could be disseminated among the ever-growing numbers of enthusiasts.

There are three basic methods of teaching flying—the so-called French system, the dual-control system, and a combination of the two largely used today for training war pilots. The French system was the first in general use, and consisted in teaching oneself to fly by the constant criticism, advice, and demonstration of a competent pilot instructor. The pupil was given a heavy, low-powered, and worn-out machine incapable of flying—usually called a "taxi"—and was given practice in running the machine on the ground. In this way he accustomed himself to the speed of an aeroplane, the incessant roar of the motor, and the use of the controls. When the pupil could run down the field in a perfectly straight line, and do it consistently, he was given "hops."

"Hops" were made on a machine but slightly better than the taxi, and consisted in making short jumps across the field at a height of four or five feet. This was the most trying part of the entire course, as at this point smashes were most likely to happen. If the pupil misjudged his height from the ground, or in his enthusiasm tried to stretch his hop into a sustained flight, the ending was usually disastrous. But if he went about matters sensibly, he would soon be promoted to "straights," or flights in a straight line, about half a mile long. The usual height in this work was 25 or 30 feet from the ground.

Having mastered straights, the pupil was given a fairly respectable aeroplane, and set to making circles. Flying three or four hundred feet from the ground, the pupil would now consider himself a finished airman. If this misapprehension did not make the pupil reckless, and result in a thoroughly smashed machine, the rest of the course would be easy. His landing practice—derived from his ground work—would now be confined to landing on a mark, or trying to. His air work would extend into figures of eight, descents with the motor shut off, and other maneuvers necessary to ordinary flying.

At every step during the course the instructor would show just what he wanted done, and the pupil could profit vastly by emulating him. Finally, when the pupil was considered competent by the instructor, he was sent up to fly for his aero-club license.

The license tests consist of two series of figures of eight flown around two flags placed about 1,000 feet apart, and of making landings within a radius of 160 feet of a mark on the ground. During the landings the motor must be shut off and the machine handled without power.

The French system had the advantage of instilling self-confidence in the pupil, as he was always alone in the machine. Its disadvantages were chiefly the length of time necessary, and the cost of such a course. The very fact that the pupil was alone prevented work in any but the finest weather, and for their own protection the schools were forced to charge for breakage of the machines. This latter item sometimes ran as high as $1,000, besides the usual $400 for the course itself. Despite the amount of breakage done by careless or headstrong pupils, surprisingly few were injured. From 1912 to 1914 the writer trained nearly 60 pupils by this system without anyone being so much as scratched.

The dual-control system teaches wholly by demonstration and practice in actual air work. A high-powered machine fitted with duplicate controls is used, and the pupil starts by riding with the instructor and watching him work. By simply resting his hands and feet on the controls the novice can feel the amount of motion necessary to handle the machine. Gradually, the machine is given over to the pupil—the pilot being ever on the alert to correct his mistakes and to demonstrate new points. As the pupil becomes more and more skillful, the pilot requires harder evolutions.

The writer believes in actually demonstrating every condition that may cause the pupil a smash when he finally flies alone, and the remedies to employ should such conditions arise. When this work is done at a sufficient height from the ground, so that there is always room to regain control of the machine, it may be done with perfect safety.

The dual-control system of teaching is somewhat hard on the instructor, as it often necessitates five and six hours in the air every day for weeks at a time. The average time in the air required to train a pupil by this method is 400 minutes, which is divided into flights of 20 minutes each. It is now used in this country by all the government schools and the private firms.

The combination, or English, system consists of equal parts of ground work alone and air work with the instructor. As the pupil becomes more advanced, the ground work is gradually dispensed with and air work—still with the instructor—substituted. Finally the pupil flies alone and after some practice is sent for his license.

Flying is not hard to learn. The essential assets are common sense and patience—nothing else is required. If a man has common sense he will realize how safe flying has become, and he will enjoy a reasonable self-confidence. If he is patient, he will not hurry through his course. A slipshod knowledge of flying is more dangerous than none at all. By taking things easy, a month or six weeks spent at a good aviation school will make a raw layman into a fairly well-trained flier—and it will give him the best sport of his entire lifetime.

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* Courtesy *Popular Science Monthly*.

CONNECTICUT AIRCRAFT CO. EXHIBIT

THIS company has on exhibition one latest type non-rigid scout dirigible with bag of model 35 feet long, showing car, propellers, etc.; one military observation balloon as being built for the U. S. Army; one model of rigid dirigible, Zeppelin type. This model is 10 feet long and a model hangar will be shown in addition.

Of the several different types of observation balloons built in this country and abroad, that employed by the Connecticut Aircraft Company which is a development of the foreign Von Parseval and Von Sigsfeld balloon, possesses many interesting features in its composition. A description of this type kite is as follows:

The balloon is made up of several units—first, the main gas bag of cylindrical shape with hemispherical ends forms the basis on which the other parts of the balloon are attached; second, a ballonet inside is sewed to the main gas bag; third, the steering rudder, better known as a "sausage" in European countries, is located at the lowest element of the main gas bag; fourth, two sails which run longitudinally with main gas bag are attached to same; fifth, tail cups; sixth, flexible steel cable for holding purposes. The above are the chief features which constitute the equipment that enters into the construction of the Connecticut Aircraft Observation Kite Balloon.

The main gas bag is built of a double texture rubberized cotton fabric which is cemented and sewed in a cylindrical form to the required size. The seams, after being sewed, are cemented and stripped with narrow strips of fabric to insure gas tightness. The seams are made to give an efficiency of 100 per cent. and still secure light weight. The ballonet, or one of the stabilizing units, is composed of fabric same as used for the main gas bag and is a diaphragm between the gas and air compartments inside of the main gas bag. It is placed in the lowest point of the gas bag when balloon is elevated at its proper angle and performs a most important function of a kite balloon. Great care must be taken in locating the ballonet properly in the main gas bag as the balloon depends to a great extent on its stability in the air by the ballonet keeping the gas in the main gas bag always at an even pressure. The ballonet operates automatically by the wind currents raising this diaphragm (ballonet). These currents of air enter an opening, or valve, under the diaphragm and after the air pressure reaches a specified point a valve between the rudder and ballonet opens automatically and relieves this pressure.

The steering rudder placed directly under the lowest point of gas bag is made of rubberized fabric. Its function is to steer the nose end of the balloon always toward the wind. It also acts as a stabilizer used in conjunction with the ballonet between which a flow of air is maintained at even pressure by inlet and outlet automatic valves. The rudder must be made of such dimensions as to allow for the least wind resistance and afford greatest steering efficiency.

The DN1—The Connecticut Aircraft Co.

There are several tail cups attached to suspension made of light weight duck and of a size to obtain greatest steadying effect. These tail cups are used to prevent a side swaying motion and act as a steadier, the same as a tail attached to a kite.

The sails of the balloon act much the same as those on a ship except they provide for a lifting result from the air pressure instead of being used as a propelling medium.

In this type of balloon a belly band form of suspension is used which is made of a band of heavy, reinforced duck. This is sewed around the main gas bag and to it ropes are attached leading down to the basket and anchoring rope. The cordage or ropes are attached to the belly band in such a way so as to distribute the strain equally over the entire balloon and require much nicety in calculating the exact points at which the different points of stress appear. The ropes leading from the belly band are arranged in such a manner so as to permit the balloon to have a free motion in the air and allow it to take the angle which will afford the least resistance. The ropes to the basket are further arranged to assist the balloon in obtaining a correct angle and further permit the basket to be moved automatically into a position that will give greatest efficiency.

ALLEGED "STUNTING"

By **LAWRENCE B. SPERRY**

IN this country, on the grounds that aviators are assuming unnecessary risks, much has been said against what is termed "stunt flying," the most common form of which is looping, tail-spins, and the like. It is not generally realized that these maneuvers on the part of a pilot make for safety in flying, but the fact is that they are generally carried out, on this side at least, with that definite object in view.

The reason for this kind of flying, in a strong, safe machine, is to teach the pilot how to recover quickly from positions that would be dangerous if maintained near the ground. How many pilots could have saved themselves from tail spins and their disastrous consequences when coming close to the ground had they known by actual experience how to recover quickly?

Some of the best pilots in this country are opposed to "stunting," because they fear to endanger their reputation as safe, sane, careful pilots. Abroad the reverse is true. The man who does not put his "bus" through, as they say, has no business to sit in a machine at all.

Instead of "pussyfooting" around in a machine in a closed field, what we need in this country is "pep" in flying. The pilot should have all the confidence that goes with the handling of a machine in divers positions, which can be gained only by actual experience.

Of course, this sort of flying should *not* be done close to the ground, even by the most experienced of pilots. If a pilot wishes to go through these maneuvers, he should first of all determine whether or not his machine is spirally stable. This he can ascertain by testing its weather-cock stability. To accomplish this let him try an unbanked turn, in which he straightens the rudder bar or takes his feet off of it to see if the machine comes out of the uncomfortable turn a tangent to it, as properly proportioned machines should.

Gradually sharper and sharper unbanked turns should be made, until the pilot is absolutely sure that there is no tendency of the plane to go into a sharper turn by itself, that is, to spin. It may be mentioned at this point, that a tendency to tail spinning, or lack of weather-cock stability, is due to there being too much lateral surface forward of the center of gravity in relation to the proportion that is in back of it. In a tail spin the fuselage of the machine while diving and spinning, continuously describes a double cone, spinning one revolution for each complete double cone described.

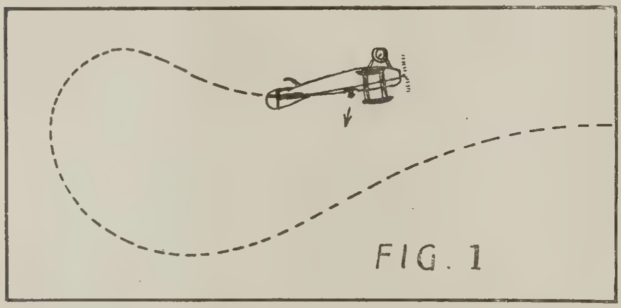
FIG. 1

The weather-cock stability of the machine and a safety factor of at least four having been assured, it would be well before trying a few loops at a fair altitude, say 5,000 feet, to make sure of two things: First, that the balance of the machine is correct; second, that adequate means are supplied for strapping the pilot closely to the seat.

The straps cannot receive too much attention. While they are often under no great strain, as in loops and other simple maneuvers, they are at times under very great strain, for example, in case of a reverse turn, bronco-like in action—namely, one of which the nose with respect to the pilot goes down instead of up, as it usually does when the machine is banked on an ordinary turn. If the reverse turn takes place while the machine is on its back or simply turning steeply banked, centrifugal force, augmented by gravity, will tend to throw the pilot upon his seat with the impact of two or three times the weight of his body. It is therefore advisable that he be strapped very tightly to the seat, otherwise he is likely to dangle six or eight inches away from the seat at certain times. This is not only uncomfortable and disconcerting, but liable to throw him upon the controls, making the reverse turn all the more severe.

A simple strap around the waist is sufficient if it is tight. Another point about strapping is the advisability of avoiding quick brake buckles, which are liable to open by being inadvertently hit by one's elbow. A strap with a buckle is safe in this respect, while a strap or belt held together by a hinge joint with a pin through it is absolutely safe. The Twombley harness I consider very good. It holds one in so securely that when upside down, one scarcely knows it.

With respect to balance, the writer advocates a machine that is tail heavy for this work and for most other purposes; provided, the machine has a slight dihedral angle in front to prevent long side slides in this state. A slightly tail heavy machine will give the pilot a maximum control in a downward direction on the tail and will be helpful in looping as well as on tail slides, etc.

Furthermore, the slightly tail heavy machine is less liable to uncontrollable nose dives. The old time fear of the tail heavy machine must be forgotten. There is always a "safety valve" in tail heaviness, whereas there is none in nose heaviness. If a machine is tail heavy, it will simply stall until the direction of air flow relative to the machine acts on the tail at a great enough angle to make the stabilizer plane, or fixed surface, support the tail; whereas if the machine is too nose heavy, there is nothing to keep it from going straight over to the vertical as a limit. Therefore, before starting, it is all important to be sure that the balance is such that the machine can be readily brought up from a nose dive.

Remember the warning that Bleriot gave his pupils—*"Tirer sur la gouvernail lentement!"* (Pull gradually on the control).

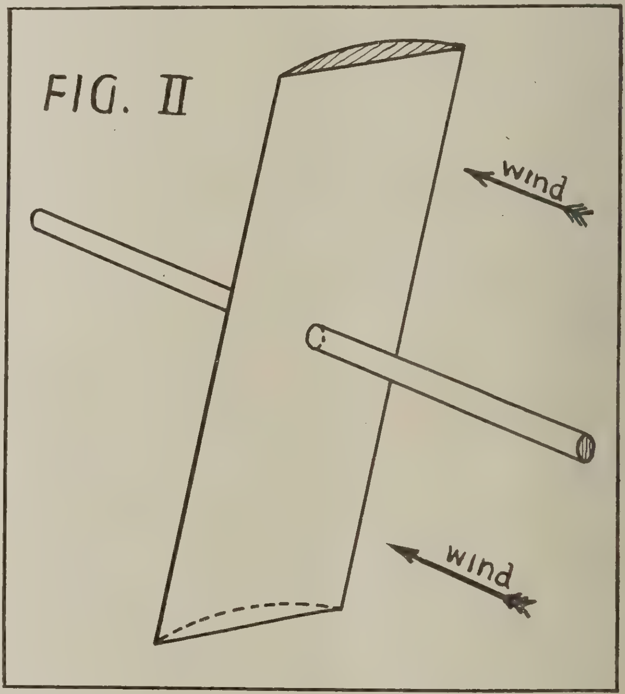
FIG. II

The reason for this is that if the tail of the aeroplane is pushed down too quickly, in an endeavor to get around fast, the fan-like action of the fixed or stabilizer surface will retard the aeroplane's speed, resulting in a poor loop.

Put the nose down a little in order to gain speed, then pull the controls in gradually at first, and harder and harder as the plane slows down, until the controls are full in, at which position they should be kept until a complete loop is made. Should the pilot push forward on his controls when the machine is starting on its back, the reverse (bronco) turn, or sudden change of direction, (Fig. 1) will force him out of his seat against his straps with tremendous pressure, causing a very uncomfortable sensation.

Not all "planes" loop readily and with many it is impossible to loop in clean-cut fashion, that is, the "plane" at the very top of the loop slides over sideways, fan-like, instead of falling or going straight around. To keep from "fanning" over side wise, one must practice to begin his loop very straight; and by practicing pulling in fast or slow, thereby getting one's relations just right, it will be possible to loop very cleanly each time, if the machine is capable of so doing.

To attempt the often impossible tail slide, start as you do on a loop, but as the machine becomes vertical, shut off the engine and push the controls forward slowly until they are fully forward. Then if the machine starts to slide backward pull them in again slowly.

On the tail slide you must remember that the controls work in the reverse direction from that in which they normally do. If the machine tips on one wing, simply follow up the tip in that direction with the control. Do the same thing with the rudder and the elevator. It is most impracticable to slide backwards any great distance.

With many machines it is impossible to slide backwards at all, for the reason that the tail slide makes the main planes present a negative angle; so that instead of lifting, a pressure acting with gravity forces them down, which action causes the fixed tail surface to present a positive angle to the frontward flow of air, making the recovery the more speedy.

To recover from a tail spin, violent as it usually is, is probably the most important thing that a pilot can learn by these extreme maneuvers. To voluntarily make a machine tail spin is not easy, especially if the machine is a well proportioned one with respect to its disposition of lateral surface.

Try to do this by putting the machine in a steep climb. The minute it stalls, push the rudder bar hard over and at the same time throw the ailerons in the opposite direction, an action similiar to spilling a pail of water. The machine will then begin to slide on its side and forward, finally starting a spin due to the pressure generated on the side of its nose.* As the tail is spinning, it will be found that the elevator and the ailerons do not act in such a way as to effect a recovery. It will be found also that pulling the elevator in simply makes the tail go around the faster; while pushing forward makes it dive more steeply, thereby generating more pressure on the nose, which then magnifies the spin.

Any movement of the ailerons aggravates the conditions. If they are moved opposite to the spin, the machine slides harder; if they are operated in the direction of spin, the spin is directly quickened. The only way the pilot can recover is to push with all his might in the opposite direction on the rudder bar. The rudder for this reason, often requires the pressure of both feet on one side to move it, which action checks the spin, so that the machine simply nose-dives instead of descending in a spinning nose dive, from which recovery is simple.

The reason the rudder works hard is the whisking about of the tail, caused by the fuselage describing a double cone with the center of gravity of the machine at its apex. This slams the rudder hard over just as a strong tide catches the rudder of a boat when its stern is sticking out from its dock.

To do a reverse turn or to place the machine on its back sidewise, the aviator must be doubly certain that he is well strapped in, as the centrifugal force trying to pull him out of his seat is tremendous. If he wishes to turn the machine on its back by going over sidewise, he will find that it will not go over, even though he moves his ailerons to their full extent, moving at the same time the rudder in the opposite direction. By this combination of control the machine will simply side slip. The only way to go over sidewise is to start a turn in one direction, and then as the plane is sharply turning, push forward on the elevator, which simply turns the machine in the opposite direction about the same axis as before, so that the pilot's head is outside the turn. The machine will then be on its back.

To fly any distance upside down is practically impossible in the majority of machines which have fixed tail surfaces. The Morane Saulnier is one of the few that have completely controllable tail surface with a large amount of control range. With the Morane, Hamel has been able to force his main plane to a large enough positive angle when on his back to glide along for several minutes.

Upside down flying is usually started as a regular loop; or when the machine is practically upside down the controls are pushed forward. The pilot, unconcerned that the earth and sky have exchanged positions, simply flies as he normally does with the nose high, as it appears to him. Flying upside down differs very little in sensation from normal flying. All controls function as they usually do. If the pilot is very firmly strapped in he will fly practically the same as he does right side up. He only notices that the sky is a very dark one and the earth a very light one, the sky to him being the earth, and vice versa. To assume a horizontal position again simply pull in on the control.

The above observations were the result of experience with a representative type of tractor biplane. Should one substitute a "plane" in which the disposition of lateral surface, with respect either to the longitudinal or to the rudder axis differed materially, that plane would most likely have different characteristics, or what is more important would require different actions of the controls to effect similar positions or recoveries.

Having perfected himself in these maneuvers, the pilot will secure the added confidence only gained by the realization that he is absolutely master of his machine.

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*An illustration of this (See Fig. II) is a flat stick with a curved back As long as rotation is not initiated nothing will happen. If you start it rotating in either direction it will spin faster and faster.

Description of New Individual Suspension Patch

By C. F. Smyth

What promises to eventually revolutionize the manner of suspending weights from balloons of all types, including dirigible bags, etc., is the "New Individual Suspension Patch" developed and patented by The Connecticut Aircraft Company of New Haven, Conn.

This patch represents a simple device of eliminating the complicated belly band and rope suspension system now commonly in use in this country and abroad. The patch is a complete substitute for the old system, there being a number of the new patches, depending on the size of the balloon, which are placed at different points of stress around the surface of the bag, making a total elimination of the belly band and complicated ends of rope tackling and cable which have always been used in order to suspend the weight to be carried.

The new patch can be placed on the surface of the balloon at any point and any angle to conform to the resistance of the strain composed on it. This is in itself an especial advantage, as it permits the entire stress of the weight to be suspended, being equalized at all points and in just the correct division of strain at each patch. This result was never obtained in the belly-band type of suspension, as no allowance could be made for uneven strains caused by conflicting air currents.

There is also a considerable saving in weight by the use of the new suspension patch over the belly-band system, as the patches are constructed by several layers of balloon fabric interwoven and separated by certain widths on the surface of the balloon, which formerly was completely encircled by the heavy belly band suspension. This was bound to absorb moisture and become heavier and more cumbersome to handle in time. The new patch is weather-proof.

In actual test of strength one of the new suspension patches placed on a section of standard balloon fabric has held over 1,700 pounds, and when a breaking away occurred it took place in the section of the balloon fabric itself to which the patch was secured and not in the patch or at the point of its attachment to the fabric. Many vigorous tests have been made with the new patch and in each test its superiority over the old belly-band idea of suspension has been unquestioned.

DIEHL ELECTRIC DYNAMOMETERS

DIEHL Electric Absorption Dynamometers are used as a means to measure the exact power developed or absorbed by engines, and their use encompasses a complete test for power used or developed under all conditions of load and speed.

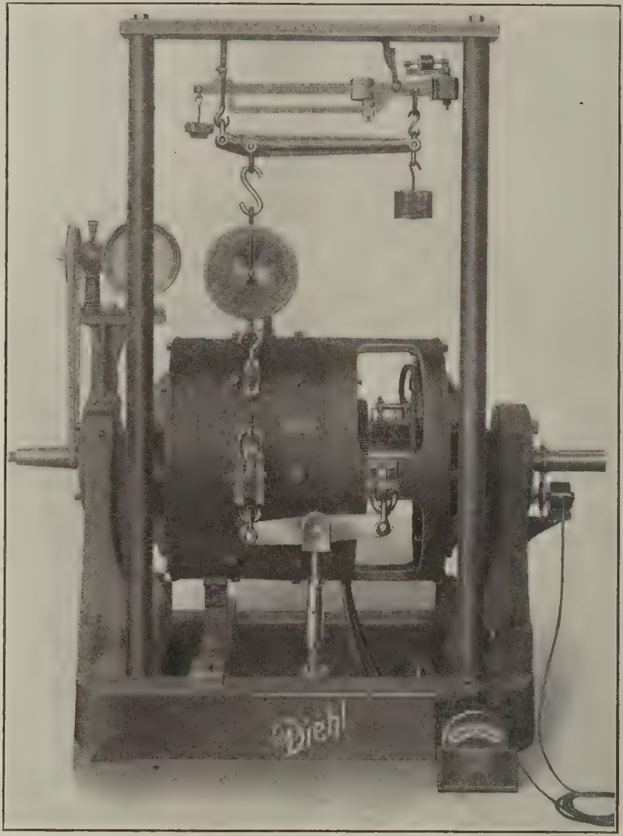
Thus the manufacturer can obtain in a Diehl Dynamometer, a unit capable of giving him accurate and positive test records without expert and expensive attendance, taken electrically, the quickest, cleanest and surest way. It gives this manufacturer's motors a distinct advantage over competing motors which have not been subjected to similar tests, as dynamometer tests show beyond a shadow of doubt the exact qualifications and condition of every motor when it leaves the factory. Figures obtained by dynamometer tests are final, accurate and usually accepted by experts without further question.

The power developed by an engine or the energy absorbed by the appliance under test is measured accurately by the dynamometer without reference to any electrical instruments or corrections of any kind. Popularly described, a Diehl Dynamometer is a combination motor and generator swinging free in a ball bearing trunnion which is so arranged that the current generated in the armature will magnetically cause the frame to follow its direction of rotation. This "pull" is communicated to a lever arm fastened to the frame which is connected to beam spring balance scales which register "pounds pull." A reading taken from these scales combined with a reading from a tachometer, showing speed of the dynamometer in revolutions per minute give the elements for a calculation of horsepower absorbed or developed. A special chart furnished with the dynamometer simplifies these calculations making them a primary task. In this way any number of readings can be taken at predetermined intervals showing variations of speed and loads of the machine undergoing test, and a complete curve plotted detailing the performance of the machine throughout its entire range. Thus its efficiency, strong points or weakness at critical periods are at once apparent.

The dynamometers will absorb full load for any length of time without undue heating. They can be used as either motor or generator. They operate quietly and without appreciable vibration. All bearing friction and electrical or other losses are recorded on the scales so that all power delivered by or to the dynamometer is measured, and is accurate to a fraction of 1% which practically represents perfection for commercial testing purposes.

The dynamometer is an electrical machine, motor or generator at will, having a free swinging frame mounted on two ball bearing pedestals, the whole being mounted on a cast iron base. The frame is perfectly balanced and can be readily turned with little effort. To the frame is attached a lever system, so arranged that the scales read correctly regardless of direction of rotation or whether machine is operating as a motor or as a generator. This lever arm is connected by means of knife edges to Fairbanks beam and and spring balance scales. These knife edges engage with specially hardened rings so that wear is inappreciable.

The yoke or frame is made of special electrical cast steel machined, both inside and out, to insure perfect magnetic and mechanical balance.



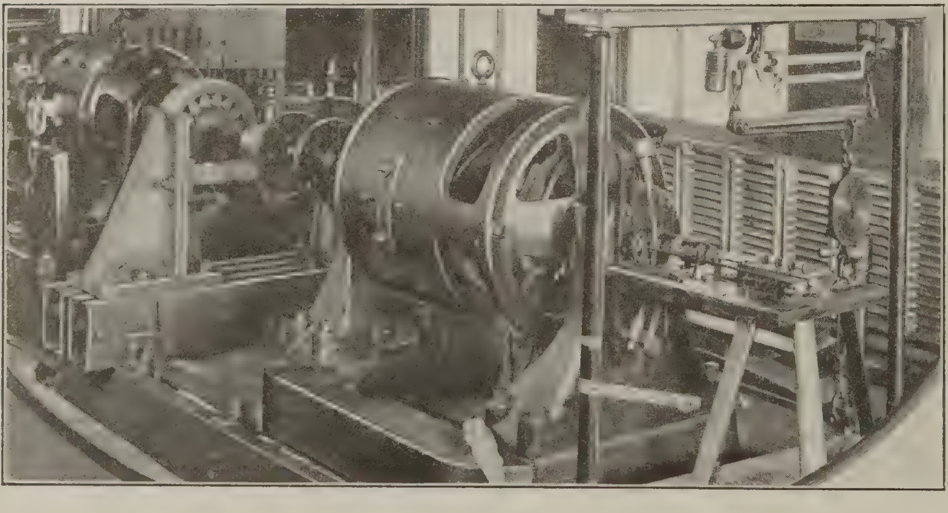
The dynamometer installed at the University of Michigan

The main pole pieces are built up of laminated sheet steel held together by rivets and supported by means of bolts to the yoke. The pole faces are designed with a view of maintaining perfect commutation at all loads and speeds and minimizing eddy currents. The interpole pieces are made of a special grade of mild steel and are of liberal cross section. They are supported by means of bolts.

End covers or bonnets are made of cast iron and carry ball bearings in which the frame swings. They also have ball bearings or sleeve bearings in which the armature revolves.

The armature shaft is made of a special grade of nickel steel. Armature laminations are mounted directly on the shaft and ventilators and spacers are provided. The laminations are carefully annealed after punching and are japanned before assembly.

The commutator is built up from hard drawn copper bars insulated with mica segments which are undercut between the bars. High speed commutators are secured against centrif-



One of the official laboratory dynamometers at the Automobile Club of America, New York City.

ugal strains by means of nickel steel shrink rings. They are also held in place by standard "V" construction of the bolted type. The commutator is spun at a high speed before being finally assembled for test.

The rocker ring is supported from the yoke and if desired may be equipped with a hand wheel for brush adjustment. Brushes of special quality are furnished especially manufactured for high speed work in general. A special type of brush holder is used which is designed for the service.

The main field is separately excited preferably from direct current 220 Volts and is wound with single cotton covered wire. The interpoles are wound with copper strap, flat or on edge according to the rating of the machine. For the small sizes of machine double cotton covered wire is used. All field coils are impregnated by the vacuum impregnating process which makes them moisture and oil proof and thoroughly insulates every turn. The armature windings are built up of copper wire or strap, each coil of which is wound on a form so that they are interchangeable. Insulation is placed on the coil itself and also in slots so as to make the machine capable of withstanding 1,500 volts ground test for one minute while hot.

The armature revolves in babbitt lined bronze sleeves having liberal dimensions. Lubrication is attained by means of turned oil rings of such dimensions that they lubricate freely without churning or throwing oil. For high speed machines ball bearing construction is used. The yoke of the machine revolves in ball bearings which are mounted in pedestals. All armatures are securely banded and carefully balanced for high speed work before shipment.

A chart is arranged which makes it unnecessary to do any computing during a test. One operator only is required. He reads the "pounds pull" from the scale and the speed from the tachometer. By referring to the chart he finds immediately the amount of power that the dynamometer is transmitting or that is being developed. Changes in speed or "pounds pull" are indicated immediately by the tachometer and scale.

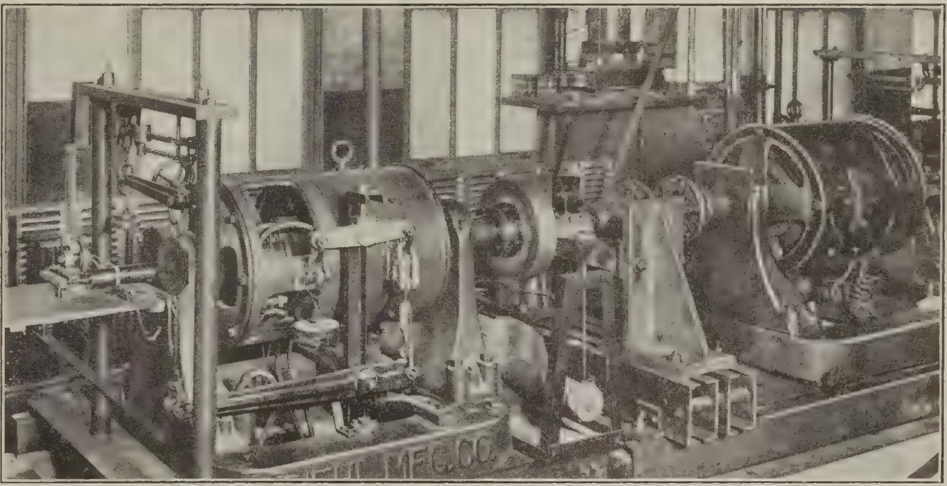
An electrical switchboard of automatic or semi-automatic type is a necessary adjunct for a one man test outfit. Upon this switchboard are mounted such instruments as are necessary for electrical control and protection such as voltmeter, ammeter, switches and circuit breakers

The control when running either as a motor or as a generator is by means of changes in the field current combined with changes in armature loading resistance. With this in mind a multiple switch starter is usually made part of a dynamometer equipment. This starter has banks of iron grid resistance connected between steps and is used not only for starting duty and for running the dynamometer as a motor at low speed, but also as an electric load to absorb current generated during test. A double pole, double-throw switch throws this resistance from the direct current supply line across the dynamometer armature circuit. Adjustment of load is obtained by cutting in and out the various banks of resistance.

Multiplicity of cylinders, short stroke, light reciprocating parts and light weight are all characteristics of the modern high speed aeroplane engine. A feature of the dynamometer testing equipments for aeroplane engines is the fact that they are designed to operate at a high speed which is necessary to test modern high speed aeroplane engines.

So many variations of Diehl Dynamometers have been built for use by various gas engine manufacturers that there is actually a size and speed for almost every requirement. So wide a range of subjects, special requirements, special conditions, exacting tests, auxiliaries, etc., have been covered by specialists that equipments have become standardized in many sizes and ratings.

A small dynamometer is constructed for testing magnetos, circulating pumps and other small apparatus. It ranges in power from ½ to 5 horsepower and is constructed on similar lines to the larger machine. The torque is registered by turned iron weights fixed at a given distance from center or by scale while the speed is indicated by a separate tachometer.



A Diehl dynamometer installed at the Automobile Club of America

PACKARD AVIATION ENGINE

THE Packard Motor Car Co. has been concentrating a great deal of effort in the development of a twelve-cylinder engine for aeroplane and airship purposes. The facilities offered in the Packard experimental department, with every instrument necessary for development work, have been employed for nearly 2 years in the development of this new aircraft motor.

Packard, however, is not yet able to announce a price nor dates of deliveries, and cannot do so until final decisions are made on several details of construction now undergoing tests. These experiments will determine the final details, and thus the price. Laboratory work now going on will settle these points within a few weeks, when more definite statements will be available. This firm is only interested in aircraft engines, and does not plan the building of planes, but rather intends to limit its efforts to the production of twin-six engines.

Twin Six With Overhead Valves

The Packard aircraft engine is of twin-six design, V-type, with overhead valves and with the cylinders set at an included angle of 40 deg. to eliminate head resistance. The engine is rated at 200 h. p. at 2180 r.p.m. The bore of the engine is 4 in. and the stroke 6 in., giving a total piston displacement of 904.8 cu. in. The engine is complete with Bijur starting motor and generator, and is fitted with two-point ignition.

The cylinders are built up of alloy steel, in blocks of three. The cylinder barrels are separately bored from solid forgings, machined outside and inside, and with attached water-jackets extending down to a point lower than is customary in automobile practice. The entire block of three cylinders with jackets weighs approximately 40 lbs.

The three-ring pistons are of aluminum alloy, with exceptionally large wearing surface, and the connecting rods are of I-beam section, machined all over. Forked-type rods are used on account of the saving in length and total weight. With an L-head motor, the length of the block is determined by the valve sizes, which allow space for side-by-side rods. In overhead-valve construction for aircraft work where quietness is not a primal aim of design, the connecting-rods are the limiting length factor. For this reason forked-type rods are used with the overhead-valve aircraft design.

The crankshaft is made from high carbon steel, drop-forged, heat-treated, and machined all over. Three main bearings are used and all bearings are 2¾ in. diameter. The front main bearing is 4½ in. long; the center bearing, 3½; the rear bearing, 2¾; while the crankpin bearing lengths are all 2⅞ in. The crankshaft is drilled out for lightness, and weighs complete, approximately 100 lbs. There is individual lubrication through each separate crank throw, to each individual crankpin bearing, force-feed lubrication being used, with a pressure of from 50 to 60 lbs.

No flywheel is used other than the light steel gear arranged at the rear end for the electric starting motor mechanism. This starter works in the usual manner, by the pressing of a foot-button.

2180 R.P.M. Operating Speed

While the engine is designed to operate at 2180 r.p.m., the propeller is geared down by a front-end spur gear mechanism to give a propeller rotation of from 1000 to 1400 per minute. This means not only that weight is saved per horsepower by keeping the revolution up to the most efficient speed for power and economy, but that there is also a large saving in the efficiency of the propeller at the slower speed allowed.

SKF

BALL BEARINGS

Safety
First
Self
Alignment

SOME
SKF Users

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Curtiss Motor Co.
Dusenberg Motor Company
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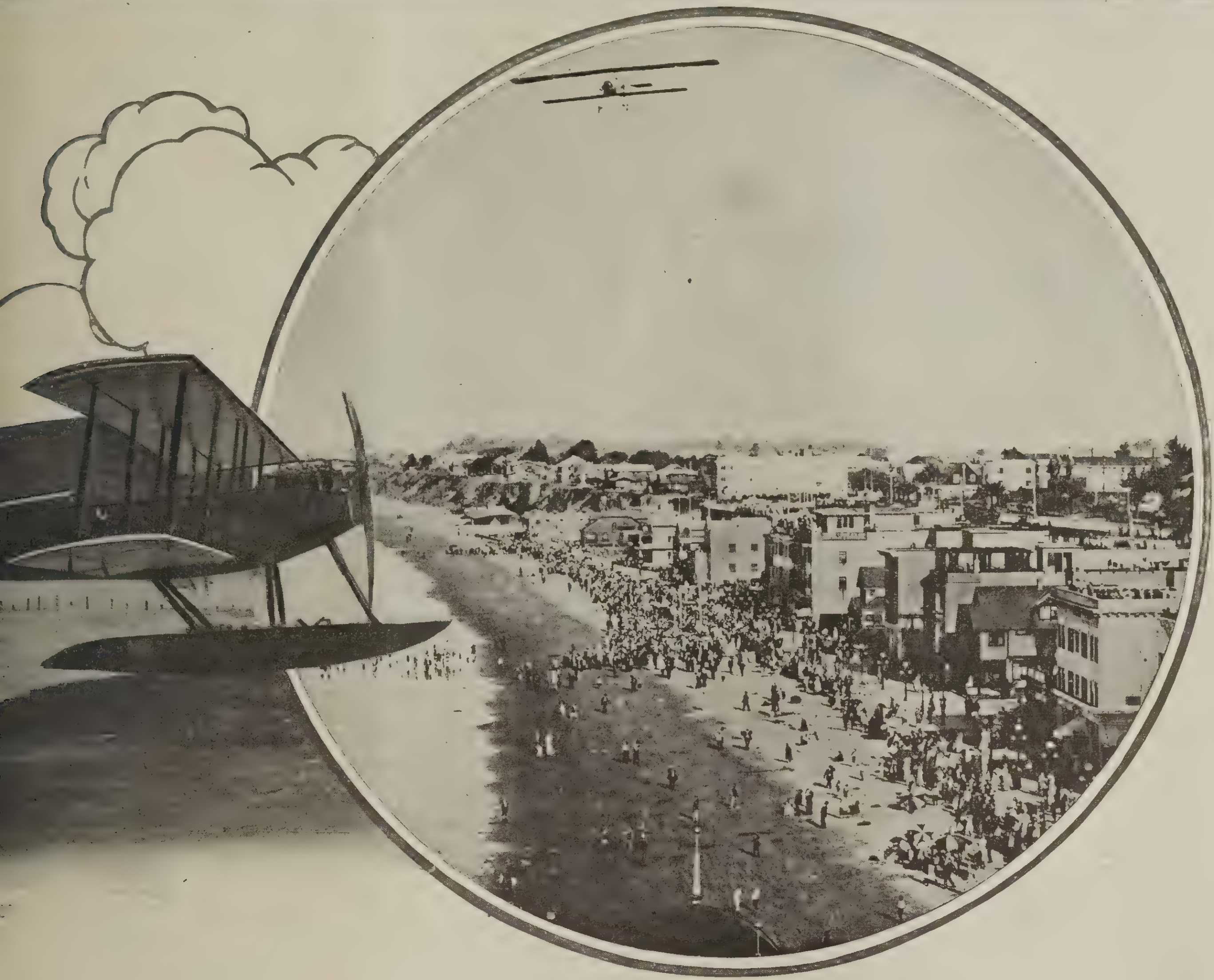


THREE miles high in the air—through swift wind—piercing smoke and fog—fast high-powered aeroplanes fly at tremendous speed. Think of the constant bombardment of explosions on the pistons—the warping and weaving of the planes—the strain on the bearings—do you wonder why the leading aeroplane manufacturers use the most efficient ball bearings at the vital power points? Can you afford to take a chance with binding strains or the sticking of bearings? If they're S K F you can soar with confidence. You can have the satisfaction of knowing that your aeroplane motor is equipped with the safest and most reliable ball bearings that money will buy. Don't trifle with price when safety and dependability are at stake. Demand S K F Self-Aligning Ball Bearings—know the feeling of security on two rows of Swedish Crucible Steel Balls.

Double Row of Balls

S K F Ball Bearings have a double row of balls. This means also a minimum load per ball. The balls are arranged in staggered relation, giving even distribution of load.

Swedish Steel

It is uniformly hard throughout, highly tempered and accurately finished. Balls and races are made of Swedish steel. This steel is unequalled for toughness and durability.

SKF BALL BEARING CO.
HARTFORD, CONN.

S K F
BALL BEARINGS
USED THE WORLD OVER

Self-Alignment

S K F Ball Bearings adapt themselves to any shaft deflection or spring. A very necessary feature for any bearing.

Ball Retainer in One Piece

The retainer cage is made in one piece, and will not jam balls, disarrange spacing, or make noise. The retainer is open at the sides permitting of easy inspection and cleaning and insuring positive circulation of the lubricant.

ACCESSORIES

Burd Piston Rings

Carbon, the cause of many engine troubles, is formed when lubricating oil passes the piston rings, is drawn into the combustion chamber and burned as it comes in contact with the hot gases.

Lubricating oil does not explode—it burns. The result is the formation of carbon deposits in the domes of the cylinders, on the piston heads, spark plugs, valve and valve seats, and behind the piston rings.

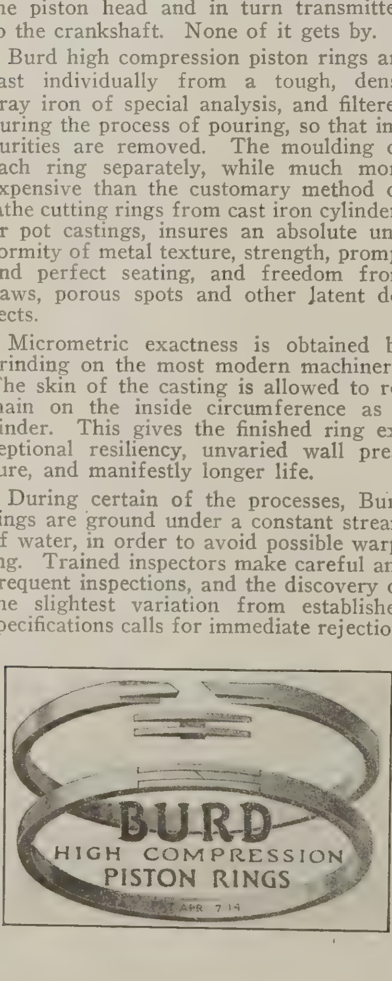
Carbon produced from burned lubricating oil is an abrasive of a similar nature to emery. If allowed to accumulate unrestricted, it works its way into the lubricating system, where it promotes abnormal wear on pistons, piston rings, cylinders, and all engine bearings; pits the valves and valve-seats; induces faulty ignition and skipping, and causes the piston rings to stick in their grooves. Lack of compression follows, and regrinding and general overhauling are often necessary before normal conditions are restored.

The best remedy for the carbon evil is its prevention. The "Guarded Opening" feature of Burd Piston Rings makes impossible the accumulation of oil within the combustion chamber. Complete combustion takes place. Every ounce of energy generated by the explosion is focused upon the piston head and in turn transmitted to the crankshaft. None of it gets by.

Burd high compression piston rings are cast individually from a tough, dense gray iron of special analysis, and filtered during the process of pouring, so that impurities are removed. The moulding of each ring separately, while much more expensive than the customary method of lathe cutting rings from cast iron cylinders or pot castings, insures an absolute uniformity of metal texture, strength, prompt and perfect seating, and freedom from flaws, porous spots and other latent defects.

Micrometric exactness is obtained by grinding on the most modern machinery. The skin of the casting is allowed to remain on the inside circumference as a binder. This gives the finished ring exceptional resiliency, unvaried wall pressure, and manifestly longer life.

During certain of the processes, Burd rings are ground under a constant stream of water, in order to avoid possible warping. Trained inspectors make careful and frequent inspections, and the discovery of the slightest variation from established specifications calls for immediate rejection.



Carter Spark Plug Detector

A new plant being erected and equipped by the Carter Spark Plug Detector Co., of Detroit, Mich., will have a capacity of 300,000 Carter Detectors a year.

The increasing demand for this scientific instrument has reached such proportions the larger manufacturing facilities have been found necessary.

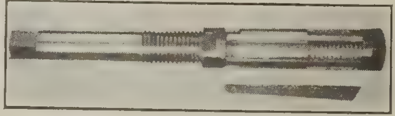
The foundation on which the Carter Spark Plug Detector operates is based on the two following conditions:

1. A cylinder firing regularly radiates the temperature of the firing chamber through its spark plug, which is within a few degrees of the firing chamber.

The spark plug thus records within ten degrees the actual heat of the cylinder wall in direct contact of the fire, the spark plug being the only body of metal in direct contact with the fire that projects outside the cylinder (all other portions of the cylinder has water (water cooled) between the firing chamber and the outside wall).

2. A cylinder missing does not radiate heat to or through its spark plug (there being no explosion in the firing chamber) but on the contrary radiates cold through its spark plug.

In fact a much lower temperature is radiated through its spark plug than the temperature of the water in the water jacket.



The reason of this is—that the continuous taking in of fresh charges of cold mixture (with such rapidity and the velocity of the mixture from the Carburetor through the intake pipe to the combustion chamber creates a much lower temperature than it was before it entered the Carburetor) and compressing under 65 to 80 pounds pressure against the spark plug makes the spark plug register a much lower temperature than the outside cylinder wall.

The detector is the only known method of proving a spark plug firing, showing that the trouble is in the valves not seating, either from carbon deposit, warped valve stem, or too close adjustment of push rods.

A spark plug will spark outside of cylinder but will not fire under compression, short-circuited.

With use you will appreciate the value of the detector—it will start you right. 1st. Spark plugs. 2nd. Ignition wiring. 3rd. Carburetor.

Have motor 100 per cent efficient by keeping all your spark plugs firing. Prevents loss of power and waste of gasoline. Requires all the power of one working cylinder to pull the missing cylinder past the compression stroke.

Above all, when your motor starts to lose power, run uneven, jerks, etc., "test out your spark plugs first." If they register O. K. then, and only then, look to your carburetor.

Gasco Vaporizer

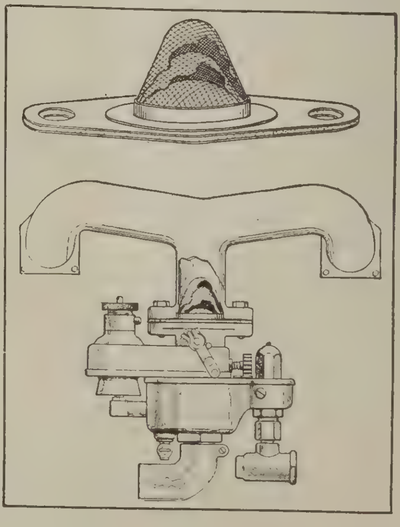
You can appreciate that anything that can be used in connection with a carburetor to assist in converting gasoline to a vaporous form and assist in the mixing with air, is going to add to the efficiency of your motor. The Gasco Vaporizer gives you a complete and uniform mixture. Excessive heating of the motor is prevented, and because of the homogeneous character of the mixture, the deposit of carbon in the firing chambers is prevented, and spark plug troubles are correspondingly reduced.

This more thorough mixture is accomplished as it passes, first, through coarse and then fine screens, causing the fuel to be thoroughly broken up or finely subdivided as it percolates through them. Fuel cannot possibly pass through the screens of Gasco and come out other than in a vaporous form in a fine spray. The more nearly the fuel approaches its molecular size, the more closely will each particle be associated with the oxygen necessary for its combustion, and the more rapid and complete will be its combustion when ignited.

Tests have shown that when liquid fuel flows on to a screen or wire gauze having small openings, like the Gasco, its surface tension causes it to spread across the openings in an extremely thin film, like the walls of a soap bubble, and when the gas or air passes through the openings of a screen so covered with the fuel film, it is completely vaporized.

Back-fire is prevented by the use of a Gasco Vaporizer, in just the same way as the screen on the miner's lamp prevents an explosion—the flame cannot pass through it to cause an explosion. The fire- prevention feature is worth more than the cost of a thousand Gascos

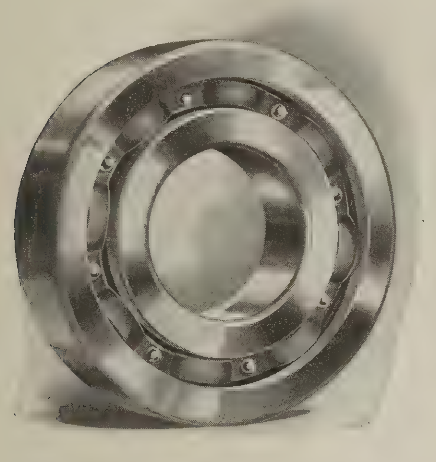
This vaporizer is made for all makes of motors, is easily installed and after the carburetor is properly adjusted, requires no further attention. For further information, write to the Gasket Supply Co., 1729 Ludlow St., Philadelphia. The vaporizer is sold with the understanding that if it does not prove satisfactory, it may be returned within 30 days from date of sale, and purchase price refunded.



Hess-Bright Bearings

The Monarch Bearings, manufactured by the Hess-Bright Mfg. Co., is a single row annular bearing of the Conrad type, similar to their regular bearings with which they are interchangeable, but having deeper ball races.

It is not a new bearing, since it was designed and first constructed by them over eight years ago to meet the requirements of an exceptionally severe service. Its success was so great that the number of applications steadily increased with ever widening field until after about six years of most gratifying experience, it was decided to more generally offer their use to which end they increased their facilities.



The deep race grooves are secured without a lessening in the thickness of the ring at the bottom of the ball track, by increasing the radial width of the race sides. This adds material to the cross section of the ring where it will be most effective in increasing its stiffness, while at the same time, its tensile strength is also increased. The advantages resulting from the deeper, stiffer rings, coupled with uniformity in cross section, are as follows:

First—The rings can be ground with greater accuracy, that is, made more truly circular, than rings of normal depth of groove, since there is less chance for deformation in chucking for the various grinding operations.

Second—They better bridge the space between adjacent balls and therefore deform under load, the tendency of which is to deflect the rings between the balls. This makes for smooth, quiet running and long life.

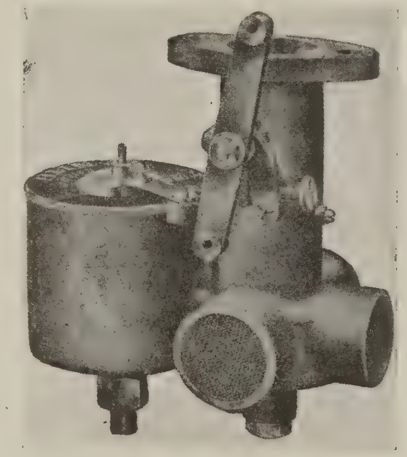
Third—It all too frequently happens in machining that the bore of housing into which the outer race should be fitted with a great slip, or sucking fit, is not perfectly round, or the lack of sufficient rigidity in the housing causes it to distort under load. This results in support of the bearing at a few points instead of uniformily around the circumference, which in turn tends to distort the outer race and that in turn to cause wedging of the balls. When it is realized how small is the clearance between balls and races—not more than one ten-thousandth part of an inch—it will be seen how often an apparently almost perfect fit will seriously cramp the balls. Indeed, if the outer race be driven (as it never should be) into a housing only slightly out of round, some of the balls will be wedged so hard as to indent the ball tracks, thus rendering the bearing unfit for service. The more rigid deep groove outer ring of Uniform cross section better resists these destructive agencies, some of which are present in greater or lesser degree in nearly all applications.

Fourth—The proper fit of an inner race is a "light drive," on a perfectly round and ground shaft, clamped with permanent side pressure between nut and shoulder or equivalent devices. If the fit be too tight it will ordinarily expand the race until the minute clearance between the balls and races is taken up, resulting in hard running, or permanent injury. If the shaft seat be not truly round, the drive fit upon it will, in the general case, deform the inner race, with resultant damage or binding in the bearing. The deep groove inner race provides both greater strength and greater stiffness to resist these tendencies and their harmful results. The wide inner race sides also make easier the problem of securing side clamping.

The Hess-Bright Co. covers defects of material or workmanship developed within one year from date of sale. They will remake or replace, free of charge, *at their factory,* any bearing returned to them, transportation prepaid, which their examination discloses to have been defective.

The Zenith Carburetor

The prime requisite in aeroplane carburetion is unfailing reliability. Each part must continue indefinitely to deliver results. This has led to extreme simplicity in design because the fewer the parts to get out of order the less chance of failure. In carbureting aeroplane motors, simplicity is now playing a big part. Very rapidly the rigid Zenith has been adopted by nearly all the important motor makers. In flying from sea level into rarified air of high altitudes the Zenith gives superior results. It is simply a plain tube device offering no restriction to the free "breathing" of the motor, and the compound nozzle of the Zenith offers true compensation at all times. It is used by the Aeromarine, Curtiss, Hall-Scott, Sturtevant and Kemp makers.



The question of heating the air supplied to the carbureter is of great importance when used on an aeroplane traveling at high speed and great altitude, and in this respect the Zenith lends itself readily to heating either by means of water or air, depending, of course, on the type of motor used.

The A. C. Titan Plug

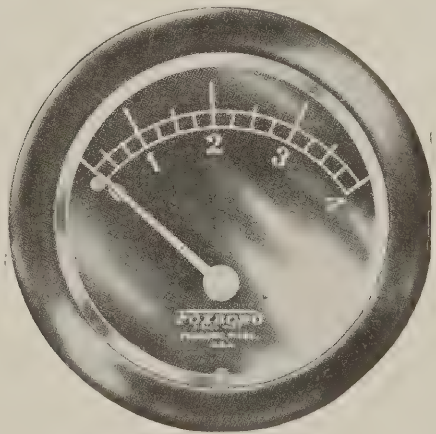
The Champion Ignition Company is now making an A. C. Titan plug in a long-body metric size particularly adapted to foreign cars and aeroplane engines. After extensive tests in comparison with the best European makes, the Renault Company, makers of the famous French Renault car, have adopted it for regular equipment.

This plug is furnished either with regular length of thread or with extension.

Foxboro Indicating Gauges for Oil and Air Pressures

Ever since the introduction of the internal-combustion engine, we have been manufacturing Indicating Pressure Gauges to show the air pressure on gasoline tanks and the oil pressure where forced feed lubrication is used. For automobile work the service calls for a low-range gauge made to withstand the hard usage of road work, and means not only an instrument which will accurately indicate low pressures, but will stand jars and shocks of travel.

With the growth of the aeroplane comes further demand for this type of instrument, which can be used to indicate the gasoline and oil pressures and will maintain their accuracy under the hard service which they are subjected to, both during flight and while landing, and the Foxboro Co. has developed this type of instrument to a state of perfection where many combinations are offered for both high and low pressures and vacuum, to fit practically any application that is desired.

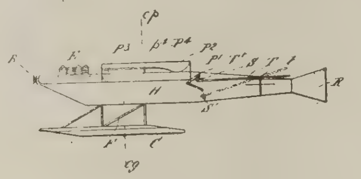


We illustrate the standard flush type instrument, calibrated for range 0 to 4 lbs. pressure. This gauge has a dull black finish ring and black dial with white figures, and white pointer. This finish is especially adapted to aeroplane work, as it is unaffected by the weather, and the white figures and pointer against the black background make them very easy to read.

RECENT AEROPLANE PATENTS

BY WILLIAM N. MOORE

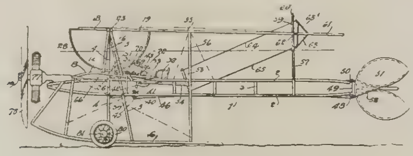
1,179,978. AEROPLANE. Roscoe P. Timson, Lynn, and George Norman Albree, Swampscott, Mass.; said Timson assignor to said Albree. Filed May 31, 1912, Serial No. 700,879. Renewed Mar. 11, 1916. Serial No. 83,689. (Cl. 244—29.)



1. In an aeroplane, the combination of supporting planes, a body, and a tail plane, all so coördinated that the center of gravity of the structure is located forward of the center of pressure of the supporting planes, and the tail plane presents its upper surface at an angle to normally exert during flight a downward air pressure pull in opposition to the downward pull of the weight of the structure, referred to the center of pressure as a fulcrum, and a support for the aviator substantially coincident with the center of gravity of the structure.

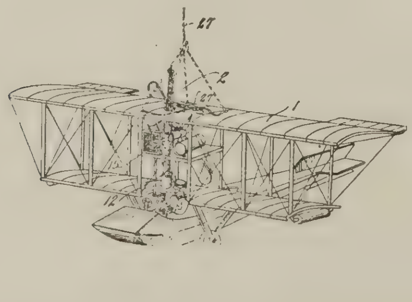
2. In an aeroplane, the combination of laterally arched supporting planes, a body, and a tail plane, all so coördinated that the center of gravity of the structure is located forward of the center of pressure of the arched supporting planes, and the tail plane presents its upper surface at an angle to normally exert during flight a downward air pressure pull in opposition to the downward pull of the weight of the structure, referred to the center of pressure as a fulcrum, and a support for the aviator substantially coincident with the center of gravity of the structure.

1,176,084. AEROPLANE. John Milford Moorhouse, Winnipeg, Manitoba, Canada. Filed May 14, 1914. Serial No. 838,520. (Cl. 244—29.)



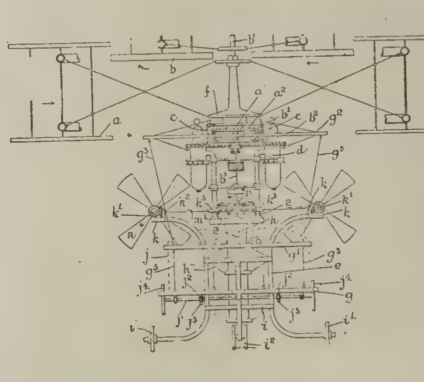
1. In an aeroplane the combination with a fuselage, a horizontally disposed man plane mounted on the fuselage, a horizontally disposed stability plane elevated above the fuselage, a horizontally disposed rudder pivotally connected to the rear end of the stability plane and a vertically disposed rudder pivotally connected to the rear end of the fuselage, of a rotatably mounted spindle carried by fuselage and provided with a cross head suitably connected wit the vertically disposed rudder, a steering post connected with the spindle by means of a universal joint and provided with a suitable hand wheel, a rocking lever carried by the fuselage to the rear of the steering post, a suitable connection between the rocking lever and the horizontally disposed rudder, a coupling bar connecting the rocking lever with the steering post and guide bars carried by the fuselage and forming a guide way for the steering post, said bars being arranged to prevent lateral movement of the steering post, as and for the purpose specified.

1,173,948. SAFETY APPLIANCE FOR FLYING MACHINES. George Giem, Palmer Lake, Colo. Filed June 29, 1915. Serial No. 37,071. (Cl. 244—21.)



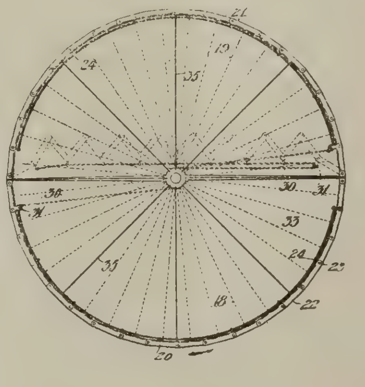
1. In a safety device of the class described, the combination of a flying machine and auxiliary sustaining means normally disposed in inoperative position, discharging mechanism for rendering the sustaining means effective, means for automatically operating the discharge mechanism upon disablement of the main sustaining means of said machine. and controlling means for rendering the automatic operating means effective or ineffective at will, comprising a locking member movable into and out of contact with the operating means aforesaid.

1,176,086. FLYING MACHINE. Samuel D. Mott, Passaic, N. J. Filed Feb. 17, 1909. Serial No. 478,412. (Cl. 244—19.)



1. In a flying machine of the helicopter type, the combination of a pair of power propellers, a motor adapted to simultaneously rotate said propellers in opposite directions, a car having a swiveling relation to said propellers, load carrying means carried by, and occupying a fixed relation upon, said car eccentrically of the axes of said power propellers, whereby the said power propellers will be normally tilted so as to give a horizontal component of motion to the machine, a plurality of similarly set steering propellers arranged upon opposite sides of the axes of said power propellers, and having a thrust at substantially right angles to that of said power propellers, means controlling the operative effect of said propellers, and a power transmission system whereby said propellers may be driven.

1,156,577. AEROPLANE-PROPELLER. Arthur Beaty, San Fernando, Cal. Filed Sept. 24, 1914. Serial No. 863,392. (Cl. 170—161.)



1. A propeller comprising blades of flexible material, and heavy members secured to the periphery of said blades in such a manner as to hold the blades in their extended position by centrifugal force when the blades are rotated.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested

Dear Editor Aeronitis:

I am very much interested in the great aeroplane race and in order that I may be listed among those who will participate I am enclosing check for $1,000. If this is not enough, kindly let me know and I will gladly send another check as I am broke at the present time, but by the time you are ready to cash the checks I hope to have plenty of spare change. You see I am greatly in debt just now as I am building an acordianplane which will be equipped with an odorengine which I am importing from a foreign country, as the fuel is best made in said country. As I am an American by right of birth, I do not care to divulge the name of the country from where the best limburger fuel can be obtained, as I deem it highly unneutral. Therefore I omit the name.

The other night I attempted to use this kind of fuel in an ordinary engine, but was interrupted by my neighbors, who did not realize the seriousness of my undertaking, so I decided to import the engine and fuel complete, as the trouble and results of experimentation will accrue to the benefit of the makers.

Far be it from me to say anything behind anybody's back, but I fail to see where your correspondent, Mr. G. E. Whizz, has any right to suggest a landing place in the great aeroplane race. I think it is inconsistent with the plans of the authorities in charge (although I do not know them) to make any such suggestion as a landing place at the north pole, especially since poles are used to denote places, such as barber shops, election places and are also of great use on wash days. Imagine an ordinary aeroplane striking a pole! But as for the acordianplane all that is necessary is for the pilot or controller to fold up whichever wing is likely to strike the pole and after passing it allow it to resume its proper position; a very simple matter. That is why I prefer it to the ordinary type, and, also because its dragon-like appearance would tend to scare away any wild animals that would attempt to harm me should it become necessary to land while engaged in the race.

But should you like to receive suggestions, I would point out the fact that a landing place somewhere in the vicinity of the Equator would prove a valuable asset toward the success of this great event. There are no poles at the Equator to interfere with the progress of the race. Further, you may not know, so I will tell you, that the Limburger Fuel used in the odorengine will produce greater results when used in warmer climates. Then again the natives of the Amazon region would be delighted to acquaint themselves with the wonderful possibilities of the acordianplane, thus adding to the pleasures of the pilot. So you see there is everything to gain and nothing to lose.

Now I don't want you to think I am imposing upon the privilege to which you are entitled in the matter of planning the race, but I do think the above suggestion would fit in nicely with your plans.

Hoping you will send me a receipt for the check enclosed and wishing you every success in selecting a southern route, I am

Yours for all that is in it,

Will B. Fine.

P. S.—Please consider the above as confidential.

(For the benefit of those who contemplate participation in this Great Race we would state that we desire all checks be certified. If this should be impossible on account of insufficient funds, kindly send fifty per cent in cash as we can use this to bribe the Amazon natives to curtail their curiosity to the extent of allowing all those who pass the Equator to land, in the event that we decide to choose the Equator as a landing place.)

Important Note

The Perpetrators of the Odor Engine and The Accordionplane beg to announce that they will *not* have an exhibit at the Aeronautical Exposition at the Grand Central Palace in New York City.

When we first heard of the Exposition, we of course desired to make a showing of the two greatest steps backward in the history of aviation, but owing to the peculiar nature of our inventions the authorities absolutely refused to allow us to exhibit the children of our brain, so to speak.

Of course, anyone could exhibit a model at rest, paint it with gold leaf and have it admired by the gullible public, but with our accustomed efficiency we wished to show our inventions in actual operation. The spokesman for the show authorities on being approached by our president, after seeing that his watch and money was secure, spoke the following:

"As the Odor-Engine depends on the action of Limburger Cheese as fuel, I regret to say that unless you furnish gas masks to every spectator viewing the engine we cannot allow you to exhibit, as we refuse to be liable for the deaths of visitors to our show."

He then drew out a plan of the floor space at the Exposition, and gently hinted that if we could afford to take an entire floor, (which could easily be fitted out with disinfectant) he would consider allowing us to exhibit. However, this was out of the question.

In the matter of the Accordionplane, he said that the show was entirely neutral, and that we would have to guarantee that we would not play the national anthems of any of the warring countries. Upon our agreeing to this stipulation he mentioned that we would have to put up a forfeit of a few thousand dollars to insure our keeping our word. Thereupon we flatly refused! It wasn't the question of money—(That's what we told *him* anyway) but we refused to have our honor doubted. And there the thing remains.

—Courtesy La Discusión (Havana).

FOREIGN NEWS

FRANCE

On the night of January 28th French aeroplanes threw down projectiles on the railway stations at Athies, Savy and Etreillers.

Lieut. Gastin on January 29th brought down within the French lines a German aeroplane of the Albatross type. This is the fifth machine brought down by this pilot up to the present time.

Three other aeroplanes were brought down in aerial combats on the 29th, one by Sergt. Hauss, who up to the present time has destroyed five German aeroplanes. It is confirmed that Adjutant Jailler has brought down six enemy machines thus far, five aeroplanes and one balloon.

On the night of January 29th French aeroplanes bombarded bivouacs in the neighborhood of Etain, military factories at Ham, stations and factories at Folenbrant and stations at Athies, Hombleux and Ourchy.

At a point northeast of Bois Hallu on January 30th, a German aeroplane was seriously damaged and brought to the ground.

In a copyright cable to the New York *Globe* and Chicago *Daily News* on January 30th, E. Percy Noel tells of France's move to a better air service. He says: "General Lyautey's appointment of General Guillemin as director of military aviation and aeronautics is regarded as an important move toward the improvement of the air service. I understand that Guillemin will have a free hand in the control which is so essential to speed and precision in production and service.

"For the past year the air department has had no head but the secretary of war, while its activity has been divided among six colonels, charged with the direction of the interior service, the army zone service schools, factories and the technical sections, and the passing of all orders to the lighter-than-air craft. These sections are divided into two groups—one concerning itself with the production of aeroplanes and the training of pilots, called the aeronautic management, and the other with the command of the active squadron.

"There will be no immediate changes of heads of departments, but all will be subject to trying out by a chief fresh from the front whose practical experience, beginning with artillery, includes infantry and aviation."

A semi-official statement from Paris was issued on January 31st concerning a German assertion that the Germans lost only 221 aeroplanes last year. The statement says the French military records show that 417 German machines were shot down by aviators, that 195 other machines were brought down otherwise, having been badly injured if not destroyed, and that 29 captive balloons were blown up.

In the air, on January 31st, activity was unceasing. Paris affirms that Adjutant Madon brought down his fifth 'plane and chronicles the exploit of an airman who, carrying a cannon on his 'plane, fired fifty-three shells into German barracks at Mesnil-St. Nicaise and Berly on the Somme. Squadrons were raiding behind the German lines throughout the day.

A German aviator dropped five bombs February 1st on Dunkirk. The War Office statement reports the damage small, and that there were no victims.

Two aeroplanes were brought down on February 2d, within the French lines by special guns, one in the direction of Oulches, (Aisne), the other near Blanc Sablons, in the region of Beauriex.

French aviators on February 3d, threw a number of projectiles on barracks and railroads at Apilly and Tergnier. A French squadron bombarded military establishments at Thionville.

M. Clementel, formerly Minister of Commerce, has formed a committee to study the use of aviation after the war, especially for national and international postal service.

Comte de Daubigny, who presided at the first meeting of the committee, said aviation before the war was a sport, during the war a weapon, and that after the war it would become a transport industry.

Besides serving France, the aerial postmen may handle British, Belgian, Dutch, Swiss and Italian mails, as well as those of the African colonies.

Stirred by rumors of possible war with Germany, most of the Americans in the French Flying Corps on active duty at the front have expressed a desire, that in the event of actual hostilities between the two countries they would naturally wish to be transferred to the United States Service.

They state, however, that they would rather remain where they are than come home and spend long periods in training camps. Ralph Lufbery, on the other hand states that he would rather remain in France no matter what the outcome of the trouble of this country and Germany.

GERMANY

Widespread aerial activity on the western front was detailed in an analysis of the fighting in that section issued by the official press bureau January 29th. It asserted allied aviators "visibly held back."

German aviators aided in shelling by heavy guns of the railroad station at Froward; in attacks on hostile batteries west of Peronne and near Cappy and Bray; in dropping 1,900 kilograms of explosives (4,180) pounds on Nueva Maisson, south of Nancy; 550 kilograms (1,210 pounds) on Dombasle; attacked French camps and Fort de Hays, near Toul.

One aviator, the statement said, performed an exceptionally bold raid in dropping from a height of ninety feet forty cases of explosives on a railroad bridge across Authie, south of Etaples (Etape?), destroying it. The same machine immediately afterward attacked a train on the north bridge and stopped it, setting fire to one car.

"In an air combat and by anti-aircraft guns, five hostile aeroplanes were brought down," the statement said, summarizing the west front activity.

On the east front it was said one Russian machine had been brought down in flames.

Seven aeroplanes were brought down by German airmen on February 1. In the afternoon a single-seated German naval battle aeroplane off the Flanders coast shot down a British single-seated fighting machine. The hostile aeroplane fell into our hands. The aviator, a British naval officer, was made prisoner.

In the northern part of the western front the airmen were very active. German squadrons obtained valuable information from the parts of France in which are the British. German adversaries lost seven aeroplanes in air engagements.

GREAT BRITAIN

Contradicting the meagre official report of the British Government, stating that the big London explosion of January 19 was due to an accident, passengers returning to America on the liner St. Louis declare the belief to be general in England that it followed a Zeppelin raid.

North of the Somme, much successful work was accomplished by British aeroplanes on January 30th and some fighting took place in the air. One enemy machine was destroyed; one of the British machines was reported missing.

On the morning of February 1st one of the British aeroplanes shot down a Fokker.

A number of fights took place in the air on February 2d. Two German aeroplanes were destroyed. Two others were driven down damaged. Three of the British machines are missing.

ITALY

A representative of the Fiat Company of Turin, Italy, who arrived here January 31st on the steamship Noordam, says that the company has built for the Italian army an aeroplane with 100 feet wing spread and two motors developing 1,100-horse power. This craft, he asserts, can carry eight men, two cannon and two machine guns and weighs 8 tons when loaded. It was being tested when he left Turin, and the plan was to head for Vienna on the first long flight.

The builders figure that it can cross the ocean easily.

The company has made plans to turn out two of the huge aircraft a day.

RUSSIA

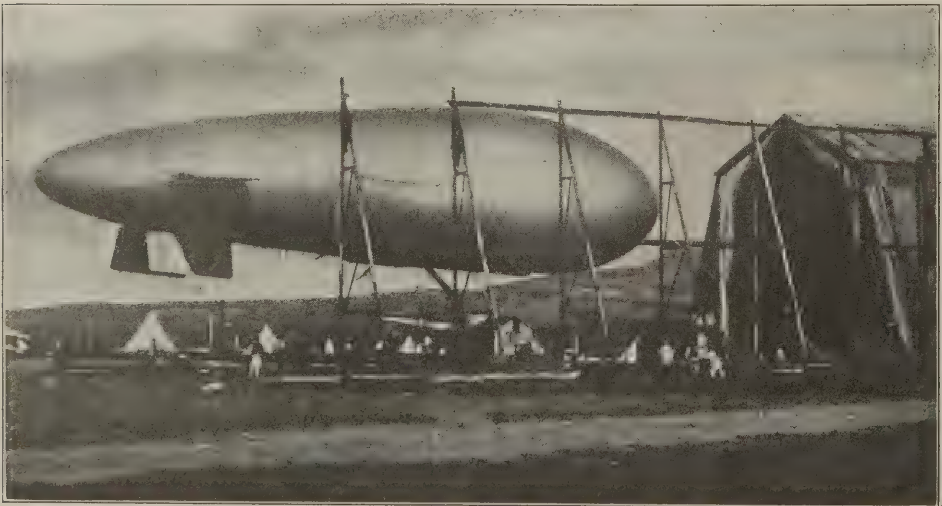
In the region of Kemmern, west of Riga, a German aeroplane on February 2d dropped a bomb, which wounded ten soldiers.

Another German aeroplane dropped bombs on the Kretzbourg station, northeast of Jacobstadt, when an express train was approaching. The train was not hit.

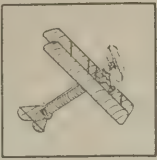
TURKEY

Violent air combats in the Kut-el-Amara district against British forces was reported in the Turkish official statement for January 26th.

A sergeant of troops on the 24th, despite hostile superiority, shot down a hostile aeroplane, forced a second to land and apparently hit a third, although this last escaped.

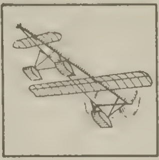


A Blimp or British kite dirigible entering its hangar near Saloniki.



MODEL NEWS

Edited by G. A. Cavanagh



CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

An English Experiment with a Steam-Driven Model

"As will be seen from the drawing, the *fuselage* was of rectangular form, being constructed throughout of ¼ in. by ¼ in. silver spruce. The two longitudinals, which were 8 ins. apart, were 3 ft. in length; the propeller brackets were 1 ft. in length. All joints were nailed and glued, the whole finally being cross-braced with wire.

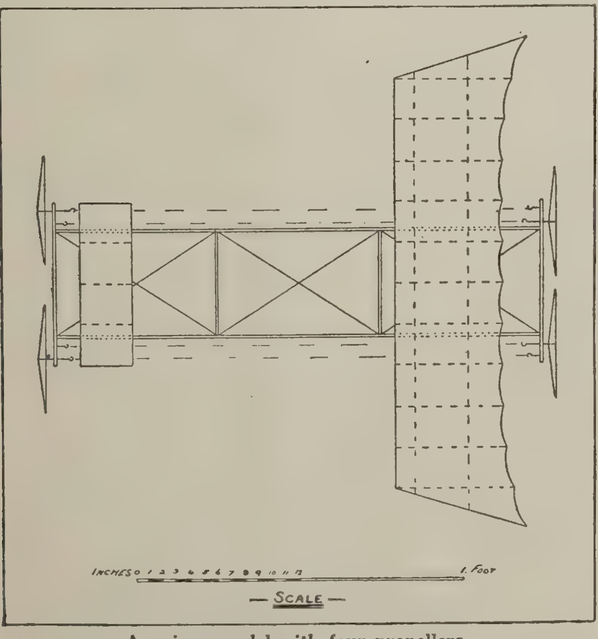
"The main plane, which was covered with Jap silk doped with one coat of varnish, was of the single surface type, and constructed of ¼ in. by 1/16 in. birch; the ribs, which were placed 3 ins. apart, were steam bent to the correct camber. The span was 3 ft. and the chord 8 ins. at centre, and 10 ins. at tips; total area 300 sq. ins.

"The elevator was of the same construction as the main plane, and had a span of 1 ft. with a chord of 4 ins.

"All four propellers were 8 ins. diameter, and had to same pitch, namely 12 ins. No doubt the rear propellers should have been of a slightly coarser pitch owing to the fact they were working in the slip-stream of the two tractors. As will be seen from the drawing, the rubber motors were placed parallel to the *fuselage* longitudinals to prevent crossing them. Each motor consisted of 6 strands of ¼ in. strip elastic.

"The total weight of the model was 13 ozs. The main plane was placed about 11 ins. from the rear of the *fuselage,* the elevator about 2 ins. from the front. The centre of gravity was situated about 1 in. in front of the leading edge of the main plane. Both main plane and elevator were originally made for an A frame twin-screw pusher model, which weighed about 9 ozs., and proved a very stable flyer, with an average duration of 20–30 secs.

"Upon altering the frame and placing the two additional propellers in front, there was no marked improvement in the duration, but the four-propellered machine was nearly twice as fast as the twin-screw machine.



A unique model with four propellers.

An English Experiment with a Steam-Driven Model

The model used had four wheels (two sets of two) in front of the c. g. and a single wheel behind, which latter is not unfrequently replaced by a skid. For all that follows, the wheels forward of the c. g. may be taken as a pair of single wheels. The model was taken to the Epsom Downs with the wings detached, and considerable time was occupied in fitting them on and adjusting them, so much so in fact that not very much time was left before darkness began to come on.

Four attempts were made in all—but only three could have given possible flights, as in the other (the last) the lamp was not burning properly owing to the orifice requiring cleaning, and sufficient power was not developed.

In each case the benzoline reservoir was charged with about an ounce of benzoline and the water reservoir with an ounce and a half of water.

No difficulty was experienced in getting the plant going save that once a valve (rubber tubing) burst (benzoline acts, of course, on rubber), but this was quickly replaced. On starting the motor and allowing the model to take its run along the ground preparatory to rising the result was as follows:—As the model commenced to lift, the front wheels were the first to leave the ground, the model still running on the hind wheel, the torque of the motor (the propeller revolves clockwise as seen from the rear) forthwith upset the model over towards the left (the speed was some 15 to 16 m.p.h.), the left wing tip (provided with a strong steel wire skid) violently struck the ground, the model swung (spun is a more correct word) round towards the left through about a right angle, righted itself, regained its checked velocity, and the same thing occurred again, and so on several times until the motor had run down. After the first experiment we all fully expected to find the wing tip smashed, but it was not damaged in the least. In the next experiment the wings were warped in order to try and prevent the trouble; the warping was, however, overdone, and this time it was the right wing tip that suffered most. In the third attempt the warp was lessened slightly, and in this attempt the model nearly succeeded in getting away, but not quite. The fourth attempt was useless, for the reason already stated. The turf was very short, but the ground was decidedly uneven and with plenty of hummocks and nasty dips. There was no wind, consequently the model was compelled to take a fairly good run before anything like soaring speed could be obtained. The way in which the model banged itself about, tearing about in all directions on the ground, was a sight not easily to be forgotten; in spite of it all, however, there were three things which did *not* happen. The model did not damage itself in the least; it did not upset, and it did not catch fire. The chassis of the model has now been altered; there is now one wheel in front (on a swivel) and two behind (three in all); the height has been reduced by about an inch and a half, and a new elevator has been made (in case of a smash), and a few other minor alterations and improvements made.

Now although nothing was accomplished in the nature of a free flight, a good many important lessons were learnt. There is first of all the chassis question. We have built several quite successful twin-screw rubber-driven, self-rising models with the two wheels in front and one behind arrangement. In the case of a single-propeller power-driven model, we should certainly not recommend it after the above results.

(To be continued)

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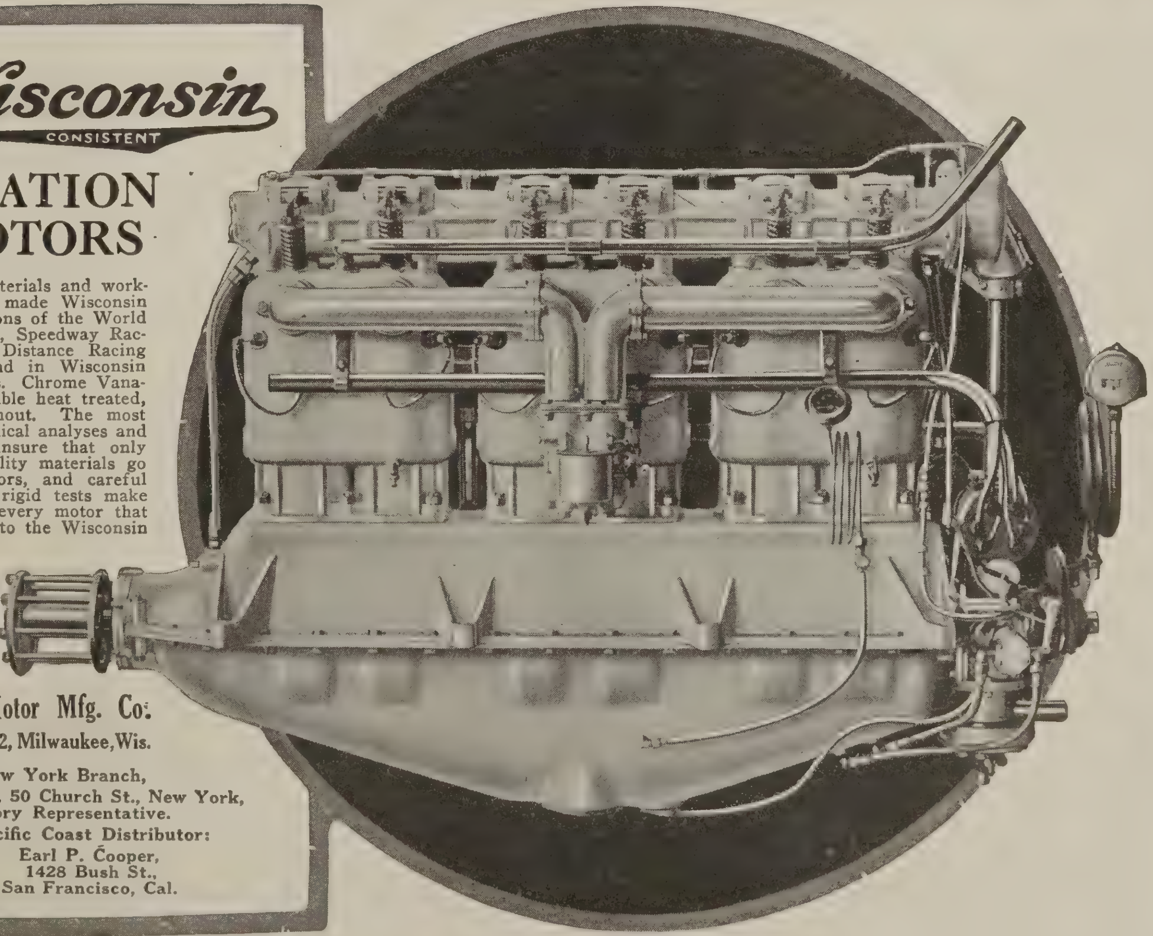

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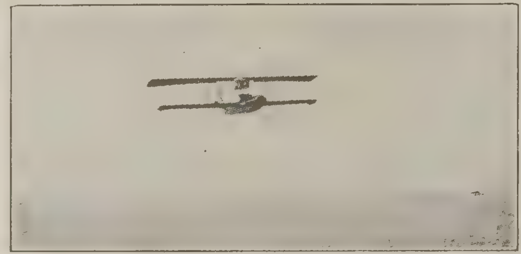

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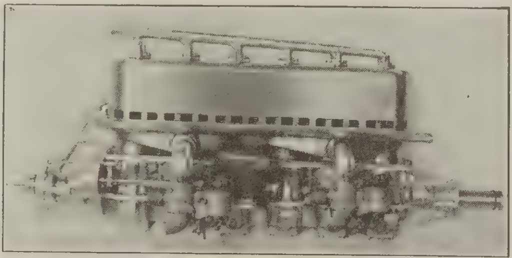

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For the double load of a single lift-truss strut against the two struts of a double lift-truss, the increase of the thickness and therefore of the air-resistance will be only about

$$100\,(\sqrt[4]{2}-1) = 20 \text{ per cent,}$$

of the air-resistance will be reduced by about

$$100\,\left(\frac{2-\sqrt[4]{2}}{2}\right) = 40 \text{ per cent.}$$

The weights being proportional to the squares of the thickness, the gain in weight of struts of a single lift-truss against a double lift-truss will be about

$$100\,\left(\frac{2-\sqrt{2}}{2}\right) = 30 \text{ per cent.}$$

2. The diameters of wires or cables vary as the square root of the load that the wire or cable can stand.

For the double load of one single lift-truss cable against two cables of the double lift-truss, the increase of diameter and therefore of the air-resistance will be about

$$100\,(\sqrt{2}-1) = 40 \text{ per cent.}$$

or the air-resistance will be reduced by about

$$100\,\left(\frac{2-\sqrt{2}}{2}\right) = 30 \text{ per cent.}$$

There is no gain in weight however in this case.

3. The larger-size wires and cables of a single lift-truss system allow a further gain in reduction of air resistance by using stream-line wires or cables. The latter are made of stream-line form by means of specially attached sharp trailing edges, which might be impracticable on the small cables of the double lift-truss system.

4. In the double lift-truss system the forces acting on each truss depend upon the position of the center of pressure; at fast flight and a small angle of incidence, the rear truss carries a greater part of the total load—roughly speaking between two-thirds and three-fourths of the total (see Fig. 38). At slow flight and large angle of incidence the reverse is the case (Fig. 37). Thus considering the two extreme attitudes, each of the trusses is either partly idle or has an extra strength and therefore weight.

In the single lift-truss the forces acting on the truss are almost independent of the center of pressure, as the reaction of the load at the root of the cantilever is equal to the load and independent of the bending arm.

Thus, the forces acting on a single lift-truss will be about 25 to 35 per cent smaller than the forces of which the front and rear trusses of the double system must take care in the worst cases. This will result in another considerable reduction of weight and air resistance.

Special Types of Side-Bracing

Fig. 39 shows a *K-type* side-bracing proposed by Capt. Martin (*Scientific American*, 1911). It is another interesting type of the single lift-truss that has all the advantages mentioned. Besides, as can easily be seen from the action of forces in Figs. 41 and 42, the extra bending moments in the I-type strut due to the cantilevers (sockets) are eliminated entirely. This advantage, however, is strongly jeopardized by the extra weight and resistance of the braces.

The Curtiss single lift-truss strut (Fig. 40), which is used in the wireless-truss biplane and in the new triplane (as far as it can be understood from the published details) is built up of two steel tubes, one straight, the other bent in two places; both tubes being enclosed by a covering. The character of cover determines whether this strut should be considered either as of the Martin's K-type, without the advantage of eliminating bending, or as a simple and cheaper type of the Dorner cantilever or I-strut type.

Finally the *X-type side-bracing* (Figs. 43 and 44) offers also certain advantages, especially as compared with the standard type (Figs. 28 and 29) and even with the N-type (Figs. 30 and 31), as it belongs in the double lift-truss class.

The advantage over the N-type is there is one strut less. The advantage over any other double lift-truss system is that the amount of load carried by each truss is practically independent of the variation of the center of pressure, although there is a certain increase of the forces due to the angularity of the struts. (See action of forces in the two extreme cases in Figs. 45 and 46.) The trusses therefore do not have as much extra strength as in all the cases of two parallel lift-trusses.

The gain in resistance and weight is evidently somewhat smaller than in the case of I-strut, but in return the X-type side-bracing is adaptable to staggered biplanes and to large big-chord wings. The I-strut, and in general the single-truss, would offer too many constructive difficulties and risk in these cases.

New Possibilities in Biplane Construction

Numerous interesting and entirely new possibilities in biplane construction can be obtained by combining the types of trusses and side-braces previously described. Some examples are:

1. Wireless truss (Figs. 16, 17 or 18) combined with N-type bracing (Figs. 30 or 31) can be treated as (*a*) double lift-truss system or (*b*) single lift-truss system. In case *b* remarkable results can be obtained by placing the front and rear bars of the *N* in vertical planes parallel to the plane of symmetry of the airplane.
2. Wireless truss combined with V-type bracing can also be treated as (*a*) on a double lift-truss system or (*b*) on a single-lift-truss system.
3. Wireless truss combined with the I-struts—an almost ideal structure for small fast machines.
4. Wireless truss combined with the X-type bracing, giving a construction with the least number of members for big-span and big-chord machines.
5. Strutless truss (Fig. 20 or 21) combined with the X-type bracing, and so on . . . as I do not attempt to exhaust, but merely to indicate the possibilities.

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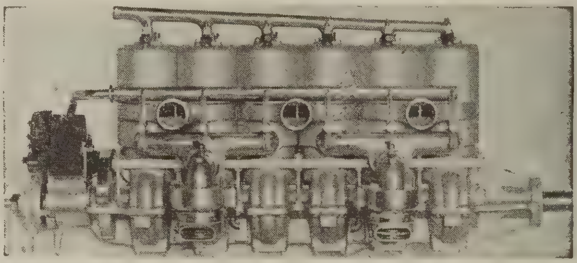

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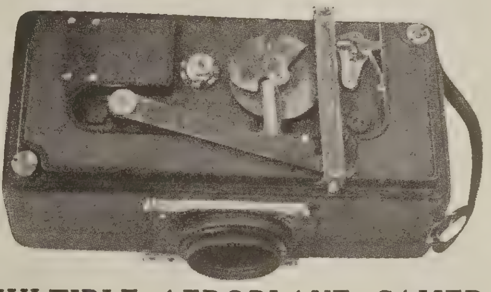

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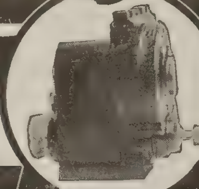

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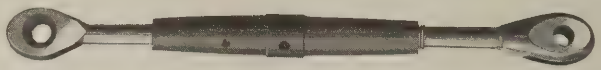

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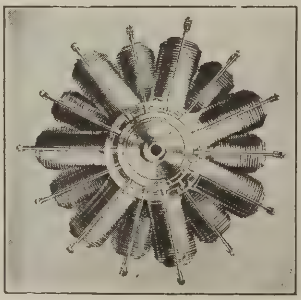

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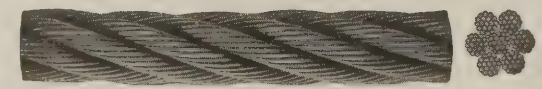

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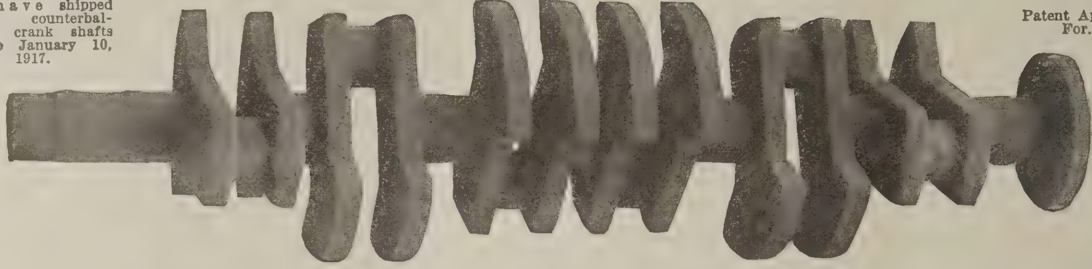

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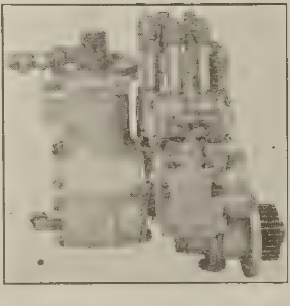

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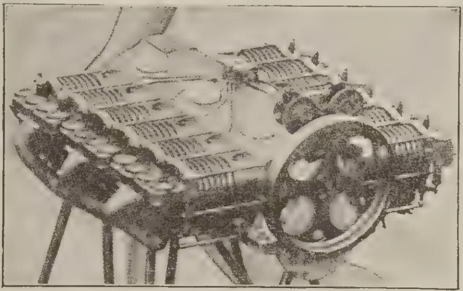

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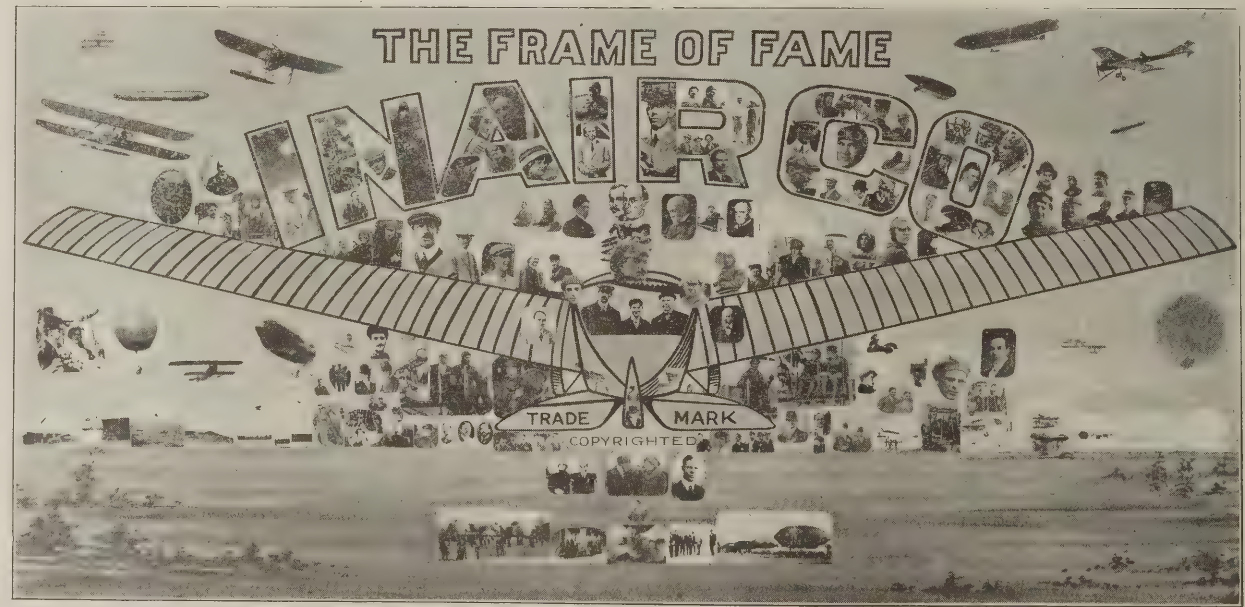

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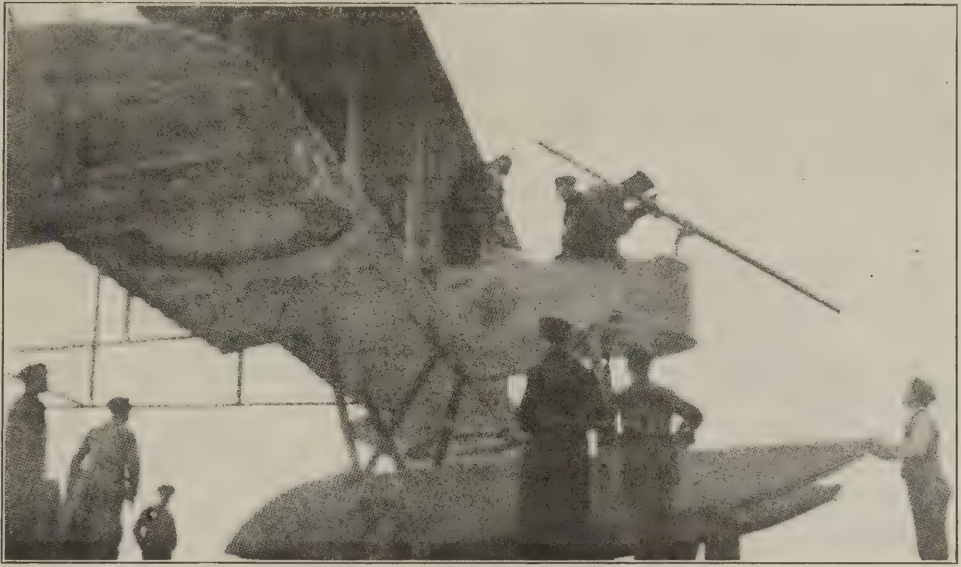

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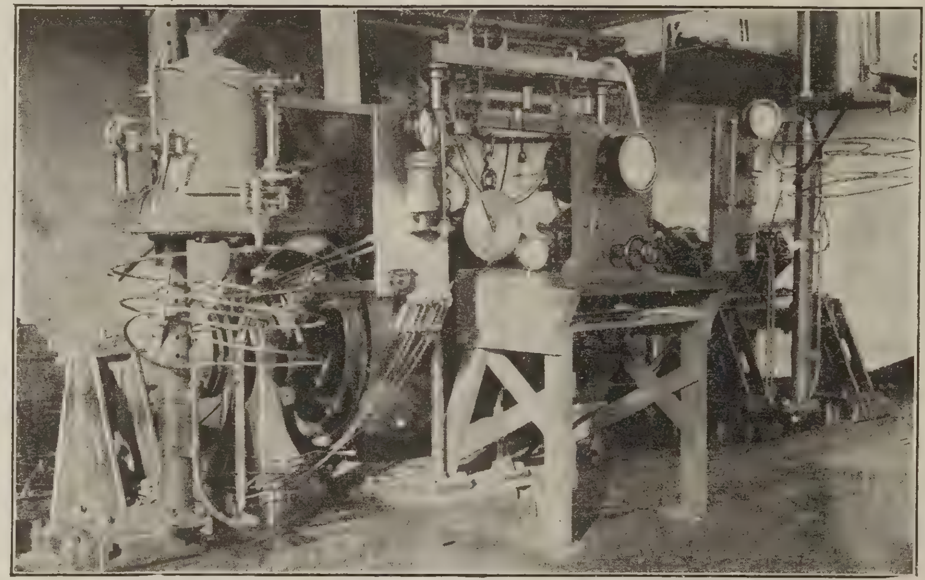
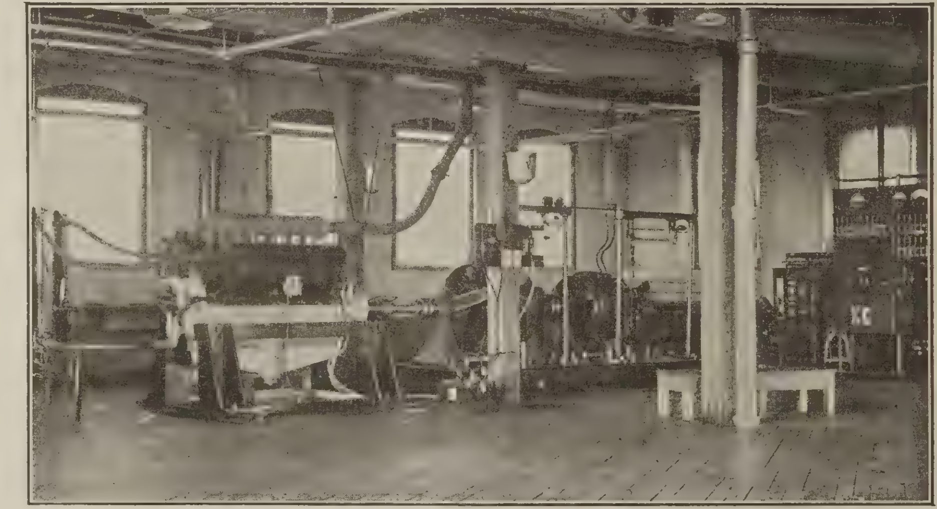


View in Laboratory of Curtiss Aeroplane and Motor Corp., Buffalo, N. Y.
See Aerial Age for July 24.



View in Laboratory of Knox Motors Co., Springfield, Mass.
See also Aerial Age for Nov. 20.

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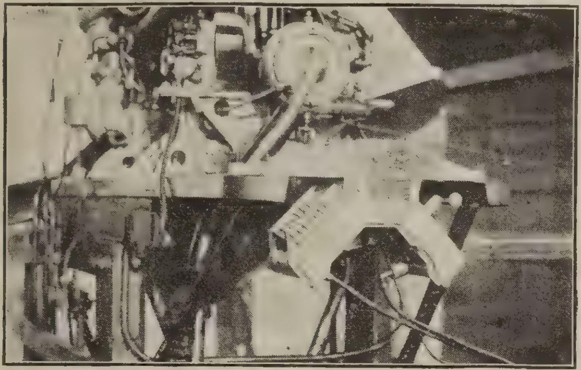
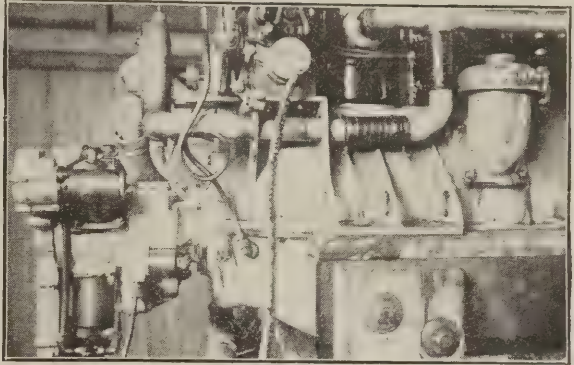


Model C starter mounted on engine



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It couples direct to the end of crankshaft of motor.

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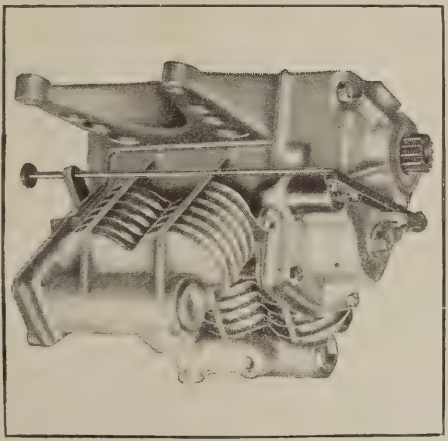
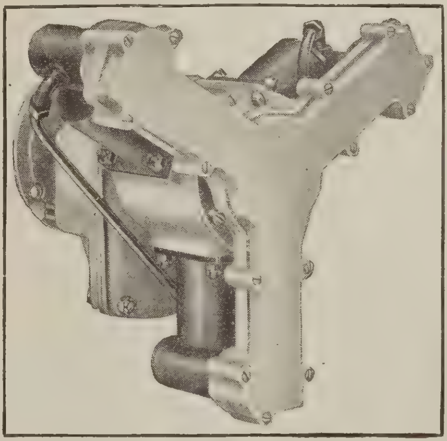


Model C

The Perfect Starter is of the compressed air type, convertible to either an air motor for starting, or an air compressor for storing air into a specially constructed tank. A transmission is combined in the construction of the device taking care of all changes of operation. It is entirely idle except when in action as a starter or a pump, and when pumping releases automatically at maximum pressure. It will average 15 separate starts on a volume of air which is pumped back in less than 30 seconds.



Model D

The Perfect Starter has been tested and approved by the United States, British, Dutch, Norwegian and Swedish Governments

THE MOTOR-COMPRESSOR COMPANY, Newark, N. J., U. S. A.

Our space at the Aeronautic Exposition is No. 238, on the Second Floor at the foot of the main stairway.

INTRODUCING

To All Manufacturers in Particular and the Public in General

MARVELITE
EVERLASTING
COLD LIGHT

the superior radio-luminous material of The Cold Light Manufacturing Company, *commercial subsidiary of the* Schlesinger Radium Company of Denver, Colorado.

At the February Show in Grand Central Palace there will be shown publicly for the first time, MARVELITE, the superior Radio-Luminous material from the laboratories that were the first in the United States to manufacture material of this character.

MARVELITE is not to be confused with materials manufactured with Mesothorium or the old-style phosphorescents; the sole source of its light is Radium. It can be seen against the brightest moonlight, and will make itself visible on any object in the dark without match or current. It is permanent for all practical purposes, can be washed without being lacquered, and has been accepted by the United States government, with whose specifications it conforms in every particular; the Canadian inspector of military stores also has approved it.

This first exhibit of MARVELITE at the Show will be found original and of the greatest scientific and commercial interest. It will be with that of the Taylor Instrument Companies, whose compasses and barometers afford a practical demonstration of this material in use.

The progress of the process of making MARVELITE will be shown step by step with views of the mines, the reduction works and the laboratories, and with samples of Carnotite ore and of Radium in its final degree of purity. Manufacturers in particular are invited. Detailed information of much interest to them will be given in both graphic form and booklets.

This will be important because of the wide variety of uses to which MARVELITE is certain to be put hereafter.

The Cold Light Company has perfected means of adapting this material to almost any requirement: Dots, stars, pointers, signs, numerals and letters in almost any size, and applicable on almost any surface, flat or curved, even or uneven.

If you are not to be at the Show, write direct today for samples and literature, giving complete information. Manufacturers are invited to send any article on which they would like to see MARVELITE applied in practical demonstration. There will be no charge.

The Cold Light Manufacturing Company

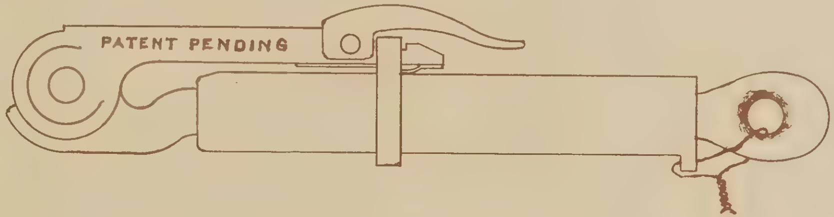
Commercial Subsidiary of the Schlesinger Radium Company

520-21 Chamber of Commerce Bldg., Denver

The Bellanca Turnbuckle

A Labor and Time Saving Invention

The purpose of this turnbuckle is to pull together, and tighten or loosen as may be desired, a metallic cord or cable. This is obtained by turning the sleeve in one direction or the other to suit the required purpose.



The advantage of this turnbuckle over many other types is that it can be attached and detached without changing the screw adjustment of the turnbuckle. It can easily be attached or detached, at the same time eliminating the necessity of readjustment.

The construction is such that ample leverage is provided to make the attaching and detaching very easy, no great effort or strength being required.

The adjustment of the BELLANCA TURNBUCKLE is accomplished by pressing down on the handle shown in the illustration until the locking device is released. The sleeve may then be rotated at will, thereby producing the desired tension. The pressure of the handle is then released and the sleeve in the handle is securely locked together.

By means of a small projection on the sleeve of the BELLANCA TURNBUCKLE, a sealing wire is introduced, as shown in the illustration, thereby preventing a readjustment by accident or design.

The BELLANCA TURNBUCKLE is manufactured to meet the recognized requirements of strength, weight and durability.

From the description above given, the advantages of the BELLANCA TURNBUCKLE over many other types will readily be seen and appreciated.

Quotations and deliveries on request.

See our Exhibit at the Aeronautic Exposition.

New York & Hagerstown Metal Stamping Co.
Manufacturers
HAGERSTOWN, MARYLAND
New York Office, 50 Church Street, Suite 390

AVIATION TRAINING

THE CURTISS School of Aviation will give training this winter, in Florida, to those civilians who may be accepted by the Aviation Section, U. S. A., upon their having made application for enlistment in the Aviation Reserve Corps. Applicants must be between twenty-one and twenty-seven years of age, possess good health, character and college education or equivalent. Tuition will be paid by the Government.

FOR FURTHER INFORMATION WRITE
THE CURTISS TRAINING SCHOOLS
CHURCHILL STREET, BUFFALO, N. Y.

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AERIAL AGE
WEEKLY

Vol. 4, No. 23 FEBRUARY 19, 1917 10 CENTS A COPY

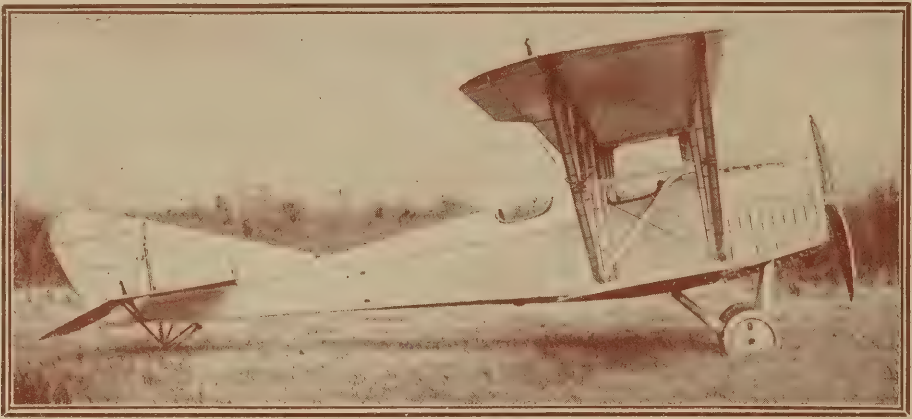
Pan-American Aeronautic Exposition a Great Success

Exhibits Presented Pictorially

Curtiss Autoplane Described

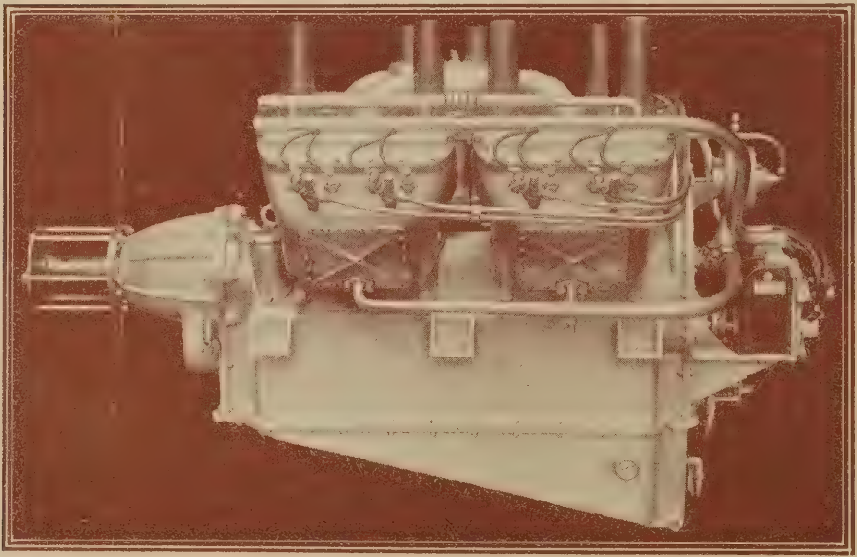
Some Notes on High Pressure Aviation Engines

By LEIGH M. GRIFFITH



THOMAS D-5 RECONNAISSANCE TYPE

A new **Thomas type** designed especially for military purposes, combining unusual **strength** of **construction, stability** and **controllability.**



THOMAS 135 H. P. AEROMOTOR

With the increased facilities afforded by a **new concrete steel factory** and **additional manufacturing equipment,** we shall be able to meet the ever increasing demand for **Thomas Aeromotors.**

Contractors to U. S. Army and Navy.

THOMAS-MORSE AIRCRAFT CORPORATION

ITHACA, N. Y., U. S. A.

The
MODERN
AEROPLANE *and* DIRIGIBLE

is only as efficient and dependable as its fittings and special parts. We are now supplying the leading aeroplane companies with a complete line of Screw Machine Requirements and Aluminum Castings. Tell us your requirements and we will submit estimates and early delivery dates.

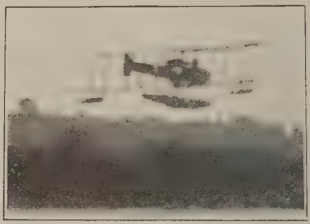
ERIE SPECIALTY CO. :: ERIE, PENNA.

With Erie Specialty Equipment your machine will be as efficient as the Pyramids are stable.

GALLAUDET AIRPLANES

MONOPLANES SEAPLANES
BIPLANES FLYING BOATS

Gallaudet propelled Airplanes and Seaplanes have been adopted by the United States Army and Navy.



U. S. NAVY
SEAPLANES
in FLIGHT

THE Company is prepared to supply all different types of machines as required, but wishes particularly to emphasize the value of machines with its new stream line system of propulsion.

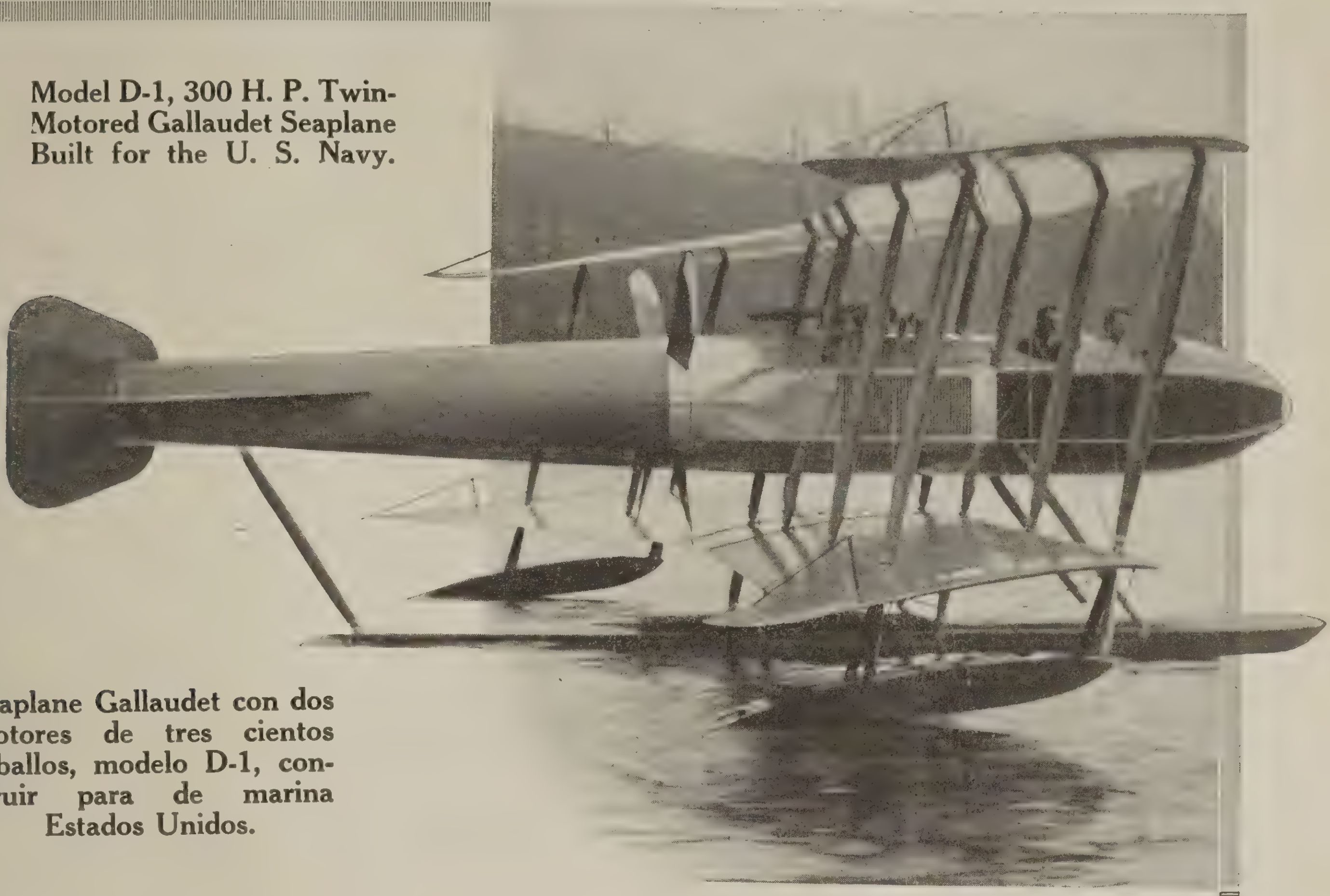
The connection between the front and rear portions of the body and the mounting of the propeller is so rigid and strong that the chance of propeller failure is less than in any other type of propeller mounting.

The part of the propeller nearest the center which absorbs power without producing any propulsive effect is inside the body so that the power usually lost in this portion is expended near the tips. The result is an increase in propulsive efficiency of 10% to 20%, according to the relative diameters of body and propeller.

GALLAUDET AIRCRAFT CORPORATION

Factory:
EAST GREENWICH, R. I.

New York Office:
Marbridge Bldg., 1328 BROADWAY



Model D-1, 300 H. P. Twin-Motored Gallaudet Seaplane Built for the U. S. Navy.

Seaplane Gallaudet con dos motores de tres cientos caballos, modelo D-1, construir para de marina Estados Unidos.

Esta Compañia está preparada para proveer todos los diferentes tipos de máquinas que se requierran; pero al mismo tiempo desea marcar especialmente el valor de cada máquina con el nuevo sistema continuado de propulsión.

La conección que existe entre el frente y el termino posterior del cuerpo de la máquina y la acción de la hélice es tan rígida y fuerte que el fracaso de la hélice es menor que en cualquiera otra máquina montada con hélice.

La parte de la hélice que está más cerca al centro y que absorbe la fuerza sin producir efecto de propulsión está dentro del cuerpo, así que la fuerza generalmente perdida se gasta a menudo en las puntas. El resultado es del crecimiento de fuerza propulsiva de 10% a 20% de acuerdo con el relativo diametro del cuerpo y de la hélice.

RAYMOND, PYNCHON & CO., General Agents
111 Broadway, New York

THE BUCK AUTOMATIC AERIAL TORPEDO

AFTER a series of exhaustive tests in Colorado, the Buck Air Craft & Munition Co., who own and control the Buck Automatic Aerial Torpedo Patents, are prepared to negotiate with Governments and other parties for production on a quantity basis.

The Buck Automatic Aerial Torpedo is an air craft equipped with a 50 H.P. Motor, and designed to carry explosives through the air to any distance up to thirty miles. A time controlled release drops the torpedo at any given distance.

The entire equipment is automatic and is launched from a compressed air catapult mounted on a motor truck, the engine of which furnishes the air for the catapult.

The torpedo can be fired at any range and at any degree of the compass.

The launching of the torpedo is without shock, and consequently the most dynamically explosive materials can be carried.

All-Metal Aeroplanes

This company is developing a series of all metal aeroplanes which can be manufactured lighter than the ordinary aeroplane and at the same time insuring greater durability. Patents are applied for on a special wing construction which is designed to eliminate all tendency to side-slip when the machine is in the air.

The Buck Gravity Stabilizer will be used on all machines manufactured by the company.

The Buck Aircraft & Munition Co., Inc.
Ernst and Cranmer Building
Denver, Colo.

New York Office
Room 327, 42nd St. Building

AEROMARINE ENGINEERING
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Designers and Contractors for
HIGHEST GRADE AIRCRAFT

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ROOM 1511, TIMES BUILDING
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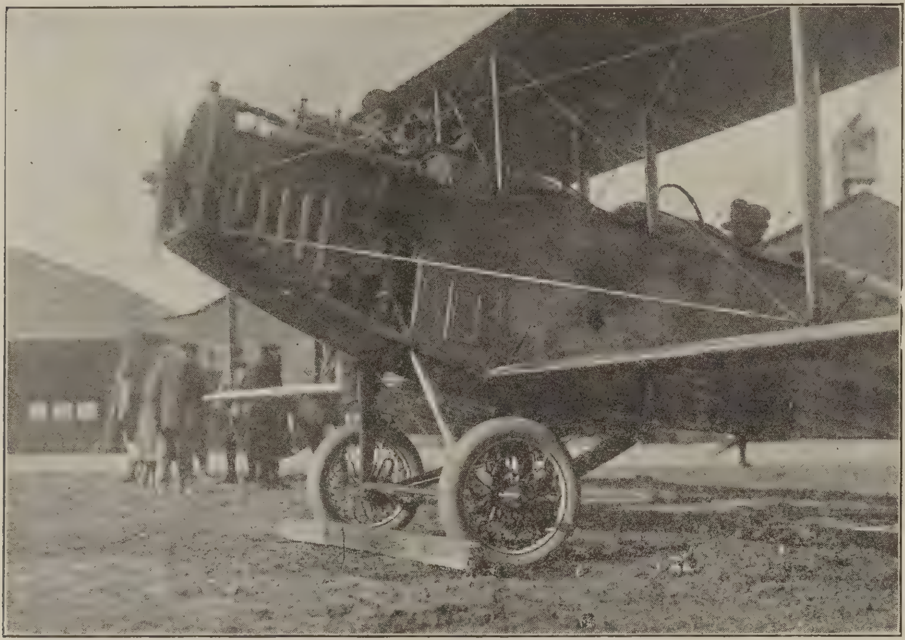


Curtiss J. N.
Tractor
Equipped With
Ackerman Wheels

"IT'S IN THE SPOKES"

AFTER four years' exhaustive tests, The Ackerman Wheel Company offers to aeroplane builders a wheel of special design that will solve many of the difficulties hitherto encountered.

In a series of laboratory tests (see illustrations below) the wheel was attached to a large case, into which was loaded 1,500 pounds of sand. A side thrust blow, with the wheel seven feet removed from the point of contact, was calculated to give the wheel a stress of 27,000 pounds. This was when the wheel struck the plain floor surface. To test the wheel to its maximum, two cleats of wood were nailed to the floor, four inches in advance of the striking point, and under this test four spokes of the wheel were broken. Calculation showed that the energy of the blow totalled 49,800 pounds.

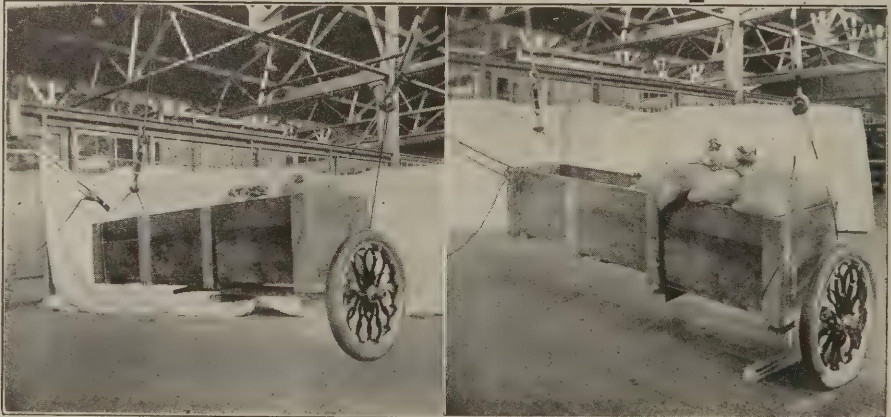
A special alloy, specially treated, is used to meet all conditions that the wheel can be subjected to. The steel receives a special process in the treating, so that it will give the required resiliency, starting at the center of the curve and gradually growing stiffer and stronger both to the hub and relative to the structure of the spoke. The spokes being made on the curve, they are hung on the hinge at the rim, being a unit in the hub, allowing them to open and shut according to the load placed on the hub.

In the aeroplane wheel it is found that the hub will leave the center four inches when maximum loaded, and return to center as load is decreased, without the springs taking a set. There has never before been a wheel invented which would meet any such conditions.

These wheels can be built according to size and weight of any load from 500 pounds up to 5 tons

Write for complete information to

THE ACKERMAN WHEEL COMPANY
Rockefeller Building, Cleveland, Ohio



Photographs Taken "Somewhere" in the War Zone

THE GENERAL ORDNANCE COMPANY

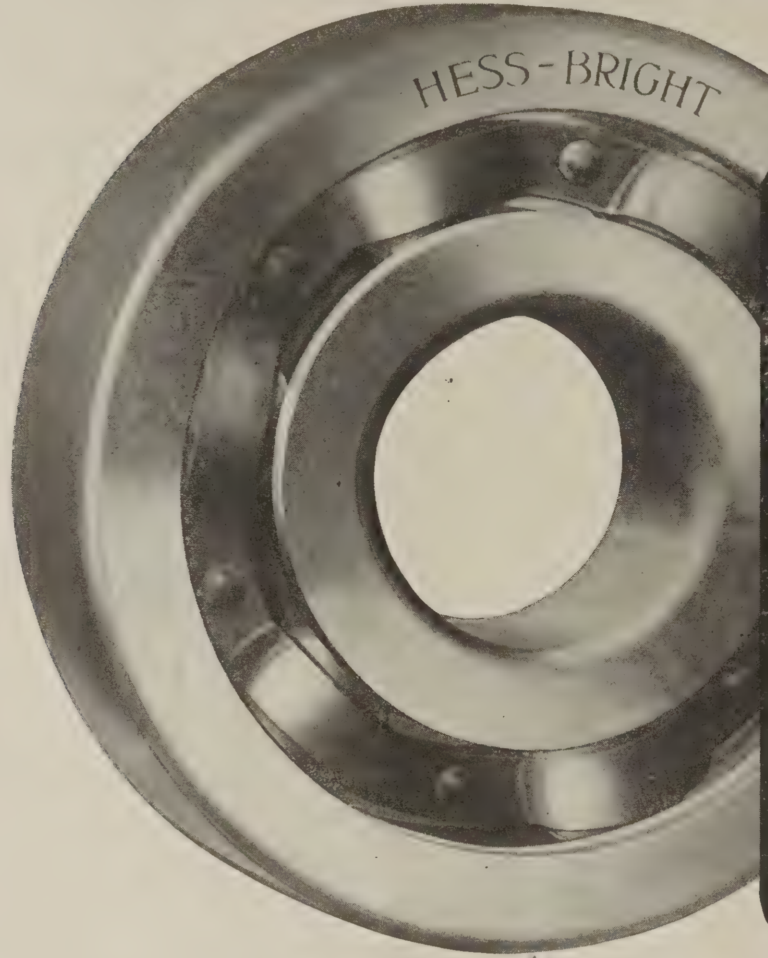
Non-Recoil Gun

Snapped in Europe December 1916

Hundreds Being Used Abroad in the War of Today on
AIRPLANES, MOTOR BOATS, AUTOMOBILES, ETC.

Sole Manufacturers (Davis Patents)

THE GENERAL ORDNANCE COMPANY
DERBY, CONN., U. S. A.



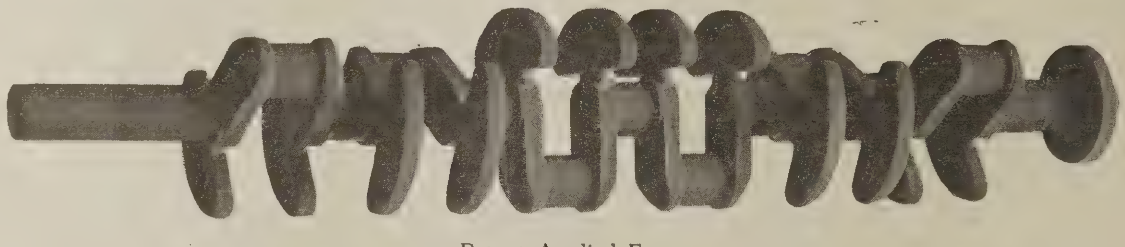
Reflected in the enduring service rendered by every HESS-BRIGHT Ball Bearing is the infinite care exercised in its manufacture. The rigid standards to which all materials must, by test, conform—the gauging and testing of each piece after every operation—the final inspection which maintains uniform microscopic accuracy in the finished bearing—these are the methods which build into the HESS-BRIGHT Ball Bearing the ability to run for years without appreciable wear.

It is endurance

The Hess-Bright
Manufacturing Company
Front Street and Erie Avenue
Philadelphia, Penna.

Hess-Bright's Conrad Patents are thoroughly adjudicated

COUNTERBALANCED



Patent Applied For.

We have shipped 34,414 Counterbalanced Crankshafts to February 8, 1917

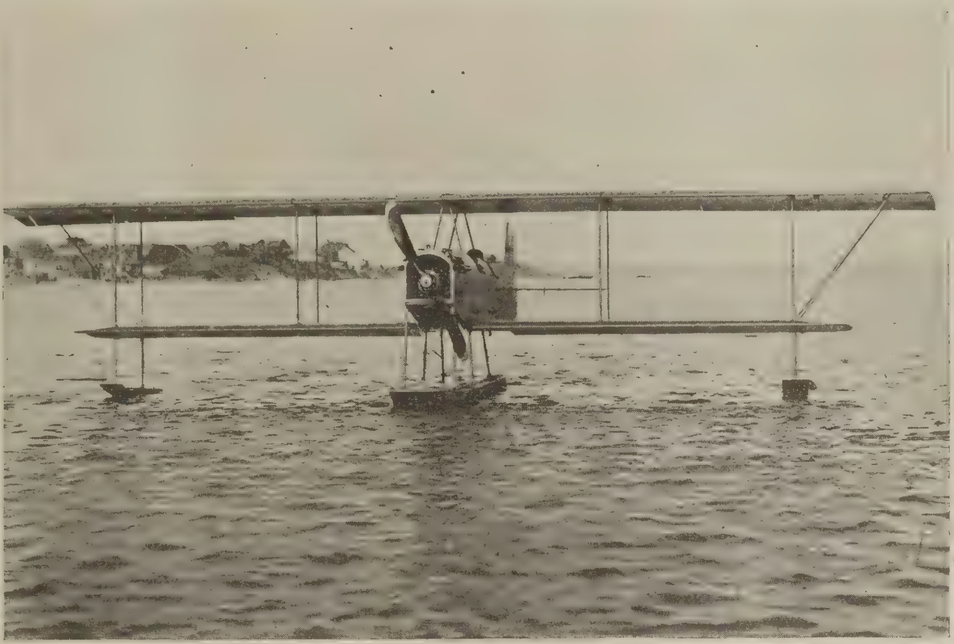
Aviation Crank Shafts

We are serving ten (10) aviation motor companies with twelve (12) different models.

We have shipped 2,622 aviation crankshafts.

Every Shaft Guaranteed.

PARK DROP FORGE CO. **Cleveland, Ohio**



BURGESS TRAINING HYDROAIRPLANE

AMONG the many models of airplanes, seaplanes and flying boats produced by The Burgess Company, the new type "U" Tractor Hydroairplane and the BD-16 Burgess-Dunne fill a very pressing need for militia training machines.

The Massachusetts Naval Militia now have the pair of these in service.

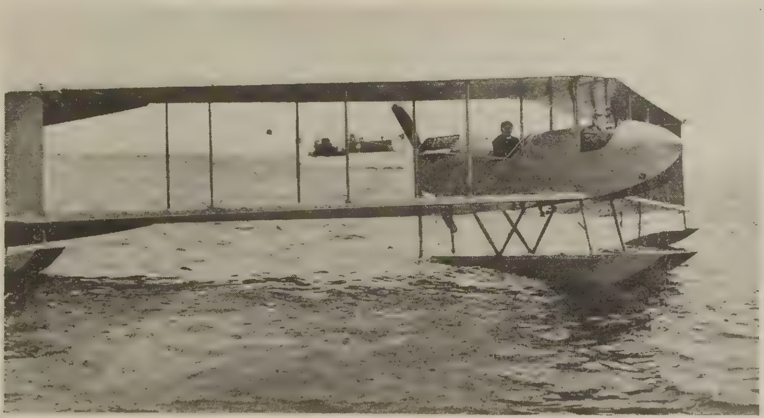
The type "U" Tractor is an efficient, well balanced flying machine of conventional type, equipped with standard Deperdussin control in duplicate, Curtiss OXX-2 motor, and single float. It is of light, sturdy construction with a large range of speed (from forty to sixty-nine miles per hour).

The Burgess-Dunne, BD-16, in construction and equipment, follows that of the Model "U." It is inherently stable in flight and has a greater range of speed (from thirty-eight to seventy-two miles per hour) and a higher rate of climb than any manually balanced machine of equal horse power.

Hydroplanes and pontoons are designed and manufactured for airplanes of every type, including Curtiss, Sturtevant and other makes.

Designers and constructors for the U. S. Army and Navy and the British Admiralty.

Sole licensee under the Dunne patents.



BURGESS-DUNNE TRAINING OR SPORTSMEN'S TYPE

The Burgess Company **Marblehead, Mass.**

The Goodyear Contribution

No exhibit at the Aeronautical Show can be regarded as a mere display of merchandise.

The smallest piece of minor equipment, every unit of machinery, as well as each aeroplane and balloon are all sublime testimony to the dauntless spirit of man. All are steps toward perfection in the conquest of the element so long unconquerable.

To the manufacturer as well as to the daring men and women who are advancing that conquest a shock absorber has as deep an interest as a life-guarding tire.

A fragment of newly developed balloon fabric is as vital as a new type of kite balloon which may serve as precious eyes for our defending armies.

Every exhibit is evidence of the contributions manufacturers are making to a far greater thing than mere technical development.

It is in this spirit that the Goodyear equipment is shown, for it is the spirit which caused its development.

When record breaking flights are made with aeroplanes Goodyear-equipped, such as those of Victor Carlstrom and Miss Ruth Law, the Goodyear organization feels well rewarded for its labor.

Not merely because its products have been notably endorsed, but rather because the Goodyear effort has been proved worth while.

Not only toward aviation is the Goodyear energy directed, but also toward that instrument of aerial mastery which the great war is justifying anew, the balloon.

For the dirigible and the kite balloon have truly come into their own, not as instruments of destruction, but as eyes for army and navy.

Since the amazing revelations in Europe the Goodyear activity which produced the prize-winner in the last great International Balloon Race before the war, has been intensified.

One of the latest results is the new kite balloon—80 ft. long and of 25,000 cu. ft. capacity—which represents a substantial advance in this type of construction.

It will not shift, veer or yaw, even in a stiff gale.

The research and engineering skill which produced it, have also produced spherical, and dirigible balloons of any size and every type, aeroplane tires, bumpers, rims and other aeronautical supplies — all shown at this year's exhibit.

The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR
AKRON

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AERIAL AGE
WEEKLY

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Vol. IV NEW YORK, FEBRUARY 19, 1917 No. 23

PAN-AMERICAN AERONAUTIC EXPOSITION A GREAT SUCCESS

THE Pan-American Aeronautic Exposition, which was opened by President Wilson, by wireless telephone, and by Governor Whitman, the Pan-American Union officials, representatives of thirty-five countries and hundreds of institutions and organizations, has closed after a week of tremendous success.

The Exposition was a success from every standpoint. The effect of the well-directed campaign to promote closer relations between the nations of the Western Hemisphere is most far-reaching and will undoubtedly make this exposition an historic event.

From the standpoint of national defense, the exposition was also a great success. It became, in fact, the rallying place for the national defense workers, and thousands of people came for the purpose of seeing what our aeronautic resources are and what the aeronautic movement is prepared to do in the event of a national emergency.

Large orders for aeroplanes and aeronautic supplies were placed and firms which had exhibited essentially for the sake of showing the American public and the purchasing commissions that the American aeronautic industry is in a position to supply even the largest demand were delightfully surprised by the large orders which they received beginning with the very first day of the exposition.

We could write pages of praise expressed by prominent people who visited the exposition, military authorities, and exhibitors. In fact, nothing but praise was heard throughout the period of the exposition. Mr. Hugo Barranco, the representative of the Cuban Government, expressed the thought of all the Latin-American representatives, when he said that the Latin-Americans were greatly pleased with the exposition; and Mr. L. M. Bradley, manager of the motor and accessory manufacturers, expressed the sentiment of those who had been skeptical when he said, "It is stating it mildly to say that this exposition went beyond my fondest expectation."

The exposition is over, but its effect will last for many months to come—and Aerial Age will print articles and reports about it for weeks to come.

THE NEED OF BUILDING OUR AERONAUTIC INDUSTRY TO CREATE SOURCES OF SUPPLY OF AIRCRAFT FOR NATIONAL DEFENSE

Excerpts from Address by ALAN R. HAWLEY, President Aero Club of America

WHATEVER builds the aeronautic industry builds our sources of supply for aerial defense. This is a truism which has been brought out strikingly in the present war as well as during the Mexican trouble last spring.

Great Britain had overlooked the necessity of upbuilding her aeronautic industry and when war started and she needed aeroplanes in large number she found it impossible to get them. The same was true in the United States when Villa raided Columbus ten months ago. Our Army had only six scouting aeroplanes available and as it had never ordered aeroplanes suitable for the conditions which the aviator has to meet at the Mexican border, it found it impossible to get immediate deliveries. The result of this unpreparedness was as great, proportionately in our case, as it was with Great Britain. Great Britain was placed at a great disadvantage through not having a substantial aeronautic industry to supply the thousands of aeroplanes needed. Their unpreparedness probably changed the history of the war, giving the Germans advantages of tremendous military importance. In our case, we know that had we had 50 aeroplanes at the Mexican border at the time of Villa's raid, the work of rounding up the raiders would have been comparatively easy. As it was, we did not get aeroplanes for many weeks after and we never rounded up the raiders. Further, it cost about $100,000,000 to carry out the campaign which could have been avoided entirely had we had the aeroplanes, needed in the first place.

Tremendous progress has been made in developing the American aeronautic industry during the past ten months. Due to the efforts of the Aero Club of America and its constituent aero clubs and organizations, the appropriations for aeronautics for the Army and Navy were increased by over $14,000,000. The placing of orders for close to five hundred aeroplanes by the Army and Navy has developed the aeronautic industry, giving work to a score of manufacturers of aeroplanes and motors. The exhibits at the exposition show that our industry has now grown extensive and efficient.

We, who were inside, have known that American aeroplanes and American motors are equal to the best European products.

Progress in aeronautics in this country is really so fast that everything seems possible. It is often our experience to have people come to us or write to us deploring the fact that we have not in this country motors of large horsepower and large or very fast aeroplanes, such as they have in Europe—and we take great pleasure in informing them that we can get in this country as good aeroplanes and motors as are obtained in Europe.

For instance, there are, to our knowledge, a dozen different types of motors ranging between 125 h.p. and 300 h.p., and as many different types between 80 h.p. and 125 h.p. Some are better than the others, some are being tested, some are about to be tested. We have aeroplanes capable of a speed of 120 miles an hour, and of lifting 15 tons. No other European nation has more than two or three types of twin motored battleplanes while twelve American firms put in bids for the Army twin-motored hydroaeroplanes. The only shortcoming has been, perhaps, lack of shop "finish." But this is rapidly being overcome.

Steps Taken to Acquire Aerial Patents for Government

WHAT is regarded as the most important advance in the development of the aeroplane industry for both war and peace purposes was taken by the House Committee on Naval Affairs February 7th, when it practically unanimously recommended an amendment to the Navy Appropriation bill appropriating $1,000,000 to enable this government to obtain control, by purchase, condemnation or otherwise, of the basic patents necessary to the manufacture of aircraft. The committee also recommended two other amendments to the Navy Appropriation bill indicative of its determination to go the limit in preparing to enforce the rights upon the high seas of the United States.

The almost unprecedented action of the committee in agreeing to obtain control of basic aircraft patents was recommended by the Secretary of the Navy and was approved by President Wilson. Further indorsement of the proposal was given by Dr. Charles D. Walcott, secretary of the Smithsonian Institution and a member of the Naval Advisory Commission on Aeronautics. Dr. Walcott appeared before the Navy Committee at its request and explained in detail the exact situation with reference to aeroplane patents.

"There is no doubt," said Dr. Walcott to a *New York Herald* reporter, "that the clearing up of the aeroplane patent situation will greatly stimulate the aeroplane industry for both war and peace purposes."

Mr. Daniels, in a letter to Representative Padgett, set forth the necessity for government control of aeroplane patents. In that connection he quoted at length from a statement to President Wilson upon the subject from the Naval Advisory Committee.

The statement showed that various companies were threatening action on patent infringements.

"The result is a general demoralization of the entire trade." stated the Naval Advisory Committee. "It is difficult to get orders filled and in order to protect themselves in case they are forced to pay large license fees companies have greatly increased the sale prices of their products. As the army and navy are the principal purchasers of aircraft in this country, they are paying a large increased cost, brought about by the uncertainty of the situation as regards aeronautic patents.

"The committee finds the situation such that immediate action is necessary if the government and the aircraft industry are to be protected and the art developed rapidly in order to meet the demands that will be made for aircraft in the immediate future.

"It appears that there are certain alleged 'basic' patents, or possibly a single patent, for aircraft, that need to be considered in the present situation and it is the unanimous opinion of the committee that such basic patent should be acquired by the government, both for the development of national defence and also for civil purposes."

In commenting upon the statement Mr. Daniels said, in his letter to Mr. Padgett:

"In view of this statement and in order to meet the conditions presented the Secretary of War and the Secretary of the Navy have recommended to the President the incorporation in the impending naval bill the following: 'To enable the Secretary of War and the Secretary of the Navy to secure by purchase, condemnation or otherwise such basic patent or patents as they may consider necessary to the manufacture and development of aircraft in the United States and its dependencies for governmental and civil purposes, $1,000,000, provided that such arrangements may be made in relation to the control of such patents and the development of aircraft as will be of the greatest advantage to the government and to the development of the industry.' "

With the exception of some of the pacifist members of the Naval committee, little serious opposition is expected to the proposed amendments relating to aeroplane patents, and to the bond issue and commandeering private shipyards. That it will prolong discussion of the Naval bill, however, is practically certain.

Winged Victories of War

(Editorial in *Philadelphia Public Ledger*)

HENRY WOODHOUSE, an official of the Aero Club, reminded the University of Pennsylvania alumni in New York on Saturday night of Kitchener's saying that an aviator is worth an army corps and of Pershing's remarks that he is as valuable as a cavalry division. The branch of the work of preparedness whose results will be surely profitable to the fullest extent for the uses of peace is the development of the flying corps. We now have fourscore aviators ready for service. We should have thousands. They could be of enormous utility as scouts to discover and announce forest fires. In half a century the loss from this cause, in the estimated value of destroyed timber alone, amounts to $25,000,000. The cost of an aerial patrol would be insignificant compared with the saving effected. It is realized that with an adequate air fleet the immensely costly operations along the Mexican border would have become in large part unnecessary. Along the seaboard the height attainable by aeroplanes even if they never ventured far from land would make them in many cases more valuable than scout cruisers. Whether the United States is involved in war or not, every step that is taken to improve the air service is a direct gain for commerce and civil life, and it is a great mistake to think that an aerial navy will have nothing to do but rain destruction on sea or land. It will be the most effectual police-patrol and guarantee of the general security.

Dawn: Cloud-High

Cloud-high I soared ere the stars had fled,
In the ash gray light of the early dawn,
While a fleecy mist like a sheet o'er the dead,
Shrouded city and village and field of corn.

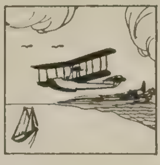
Blood-red the Sun like a beacon of light,
Peering above the rim of earth,
Places in rout the phantoms of night,
Bringing all life and joys to rebirth.

Looking down from this kingdom where solitude reigns,
With the rivers like veins on an ivory breast,
Hilltop and valley stretch out to vast plains—
And the Sun pulls the blanket of mist from men's rest.

E'en tho' I'm only a speck in the sky
Yet am I slow to descend again—
Monarch of all I survey when I fly,
I'm loath to return to the world of men.

J. U. N.

THE NEWS OF THE WEEK



Prominent Colleges to Organize Aero Corps

Following conferences between the Aero Club of America authorities and groups of college men from Yale, Harvard, the University of Pennsylvania and Columbia University, the Aero Club officials announced that we may expect in the near future to have aero squadrons representing each of the above universities.

Not less than twenty-five Yale men are taking steps to become aviators. This includes the members of Aerial Coast Patrol Unit No. 1, which is headed by Mr. F. Trubee Davison, son of H. P. Davison.

Harvard has nine licensed aviators, ten who have had a partial course of training and twenty others who have volunteered their services and are ready to take up a course of training as part of the Aerial Reserve Corps or in any other way which makes it possible for them to become military aviators. A meeting of the Harvard men interested in aeronautics is to be held at Cambridge under the auspices of the Harvard Undergraduates' Aero Training Fund, of which Mr. Roger Amory of Boston is the chairman. Twenty-one Harvard men took a course of training in aviation last summer and have been corresponding with the War Department with a view of joining the Aerial Reserve Corps and getting additional training at one of the aviation fields near Boston, so as not to have to give up their studies. Captain Milling, of the Aviation Section, Signal Corps, U. S. A., was to address the aviators, but he received a wire from Colonel Squier that it would be impossible for Captain Milling to attend the meeting and that arrangements would be made for giving instructions to the Harvard men in the near future. A delegation of the alumni of the University of Pennsylvania, represented by Frederick E. Davis, Joseph E. Lockwood and Edward Winter Killgore called on the Aero Club officials for advice and guidance as to how to organize an Aero Squadron, stating that there are not less than fifty alumni of the University of Pennsylvania who are anxious to join the air service.

A number of Columbia men have also applied to the Aero Club of America for advice as to how to form a Columbia Aero Squadron.

The Aero Club encourages all and directs their activities and supplies candidates with applications for the Aerial Reserve Corps. If they wish to organize volunteer aero squadrons, the officials give them the necessary information and guidance.

A number of the Club officials, including Mr. Alan R. Hawley, the president; Rear Admiral Robert E. Peary, chairman of the National Aerial Coast Patrol Commission; Henry Woodhouse, Charles Jerome Edwards, Augustus Post and other Club members, including Rear Admiral Bradley A. Fiske, Roy U. Conger, Harrison Williams, Bernard H. Sandler and Walter O. Adams, are giving their entire time in assisting to develop the aerial reserve.

To Purchase Kite Balloon

Encouraged by the amounts already subscribed by visitors at the First Pan-American Aeronautic Exposition in Grand Central Palace the sponsors of the Balloon Training Fund are energetically working to swell the fund of $10,000 to purchase the huge Army balloon now being exhibited at the show. Mrs. Charles A. Van Rensselaer and a number of friends who are interested in aerial coast defense have arranged to purchase the balloon. Four subscriptions of $250 each were made since the show opened, by Mrs. Reginald de Koven, James Marwich, Griswold Thompson and Henry Woodhouse, while Mrs. Stuart Duncan and others have contributed substantial sums.

The present national emergency has found this country entirely unprepared in the matter of operators for observation balloons for coast and field artillery, mine planting and submarine spotting. The Army and Navy have only two operators each, who on account of the shortage of personnel must perform other duties, and, therefore, have not been able to proceed with training other operators. As a result, the seventy-trhee forts of our coast artillery system and the forty-five batteries of field artillery which should have two balloons each (118 in all), have not a single one. They are blind, as it were, so that the territory which they should protect would be at the mercy of the long-range guns of vessels lying beyond the point of vision of the artillery observers stationed in the forts. There are hundreds of millions of dollars invested in the coast artillery and field artillery, which would be ineffective without the aerial auxiliary.

The Aero Club of America, after investigating the matter, reported that there are no prospects of getting operators needed this year or next unless a training schools is established, on the order of the Plattsburg training camp idea, to train civilians, who will then join the Aerial Reserve Corps. To meet this need and establish such a training school at Governor's Island, under the auspices of the military authorities, Mrs. Van Rensselaer started this fund. The instructor has been obtained and General Wood has approved the arrangements. The cost of establishing this school is $10,000, while the adding of a dozen balloon operators to our defences to train others will be a priceless contribution toward the upbuilding of our defences at present when the Army is not in a position to attend to that.

Aeroplane Manufacturers' Association Meets

Representatives of fifteen aeroplane companies met at the Hotel Manhattan last week, and formed the American Association of Aircraft Manufacturers. Their first action after organizing was to place their combined capital of $30,000,000 and output of 175 aeroplanes a week, as well as the entire resources of the fifteen member concerns, at the command of the President.

This telegram was sent to the President:

"Aeronautic manufacturers have today organized for the purpose of co-operating with the Government. We pledge our full support and place our combined efforts and resources at your command."

Press despatches state that in pledging themselves unreservedly to the support of the Government, a resolution was adopted, which said, in part:

"Aeronautical manufacturers assembled in New York City for the Aeronautical Show are fully impressed with the grave possibilities of our Government at war, and we fully believe the air machine to be one of the best possible aids to the Government in both offensive and defensive war manoeuvres.

"Be it resolved, that we pledge our full support to President Wilson, with our complete co-operation, and be it further resolved, that a telegram confirming this resolution be sent to President Wilson."

The chief motive of forming the association is to help the manufacturers to work together for the general good and to provide this country with a supply of efficient aeroplanes in the shortest possible time.

The fifteen companies at the meeting were the International Aircraft Company, represented by Captain H. P. Wild; the Burgess Company, represented by W. E. Doherty; the Curtiss Aeroplane and Motor Corporation, represented by F. L. Faurote and J. L. Cole; the Thomas-Morse Aircraft Company, represented by A. L. Morse; the F. H. Flint Engineering Company, represented by A. H. Flint; the United Eastern Aeroplane Company, represented by Fred C. Hild; the Gallaudet Aircraft Corporation, represented by F. Gates Porter and S. C. Munoz; the Brook Aircraft Company, represented by W. M. Blair; the General Aeroplane Company, represented by Corwin Van Hussan; the American Motorplane Company, represented by C. A. Herrman; the John D. Cooper Aeroplane Company, represented by John D. Cooper; the A. S. Heinrich Corporation, represented by Albert S. Heinrich; the Standard Aero Corporation, represented by H. B. Mingle and D. L. Mennan, Jr., the S. S. Pierce Aero Corporation, represented by Sidney L. Breeze, and the Benoist Corporation, represented by F. M. Benoist.

New Seaplanes for the Aerial Patrol

Work was started simultaneously in New York City and in Palm Beach to develop the National Aerial Coast Patrol. F. Trubee Davison, organizer of the Aerial Coast Patrol Unit No. 1, had a conference with the officers of the America Transoceanic Company with the view of sending to Palm Beach six seaplanes to be added to those already in Florida for work in the national defense training school. Two of the seaplanes are the property of Mr. Davison, and he is making arrangements for the purchase of four others. All will be shipped to the South as soon as possible.

Five seaplanes are already in Palm Beach, the property of Rodman Wanamaker, head of the American Transoceanic Company, and they have been used in practice cruises around the winter resort for several months.

From Palm Beach word came that Caleb H. Bragg, of New York, had taken up the enlistment of the patrol and had enrolled William Larned, formerly national tennis champion; Hector Munn, Legrand Cannon, John Rutherford and Frank Frazier, and hoped to have others within the next twenty-four hours. Mr. Davison himself enlisted the following volunteers in his organization at the beginning:—Robert A. Lovett, John Vorys, John Farwell, 3rd; Albert Ditman, Wellesley L. Brown, Artemus L. Gates, Earl Gould, Allan Ames, C. D. Wiman and A. D. Sturtevant.

Plan to Perpetuate Aviation Monument

To dedicate and rebuild the Column of Progress, one of the features of the Panama Exposition at San Francisco, and to install it in that city as a monument to aviation and aviators is the plan of the Pacific Aero Club. This organization is well represented at the Aero Show now being held in the Grand Central Palace, and a large number of people have become interested in the plan to perpetuate the column which was dedicated to aeronautics on January 13, 1915, by Augustus Post, of the Aero Club of America.

The column symbolizes energy, and is 184 feet high. It was designed by McKim, Mead & White, a firm of architects, who erected it with the assistance of two sculptors, H. A. McNeil and Isadore Konti. It is planned to design a number of tablets telling of the pioneers of America in the field of flying to place at the base of the column.

Originally built with a steel frame and with only a plaster cast shell the estimated cost of reconstruction is $30,000. More than $7,000 has already been secured by the Pacific Aero Club, and it has been decided to raise the rest of the required sum by national subscription. J. C. Irvine, president of the club, is the leader of the New York delegation of the organization, and he hopes to close the subscription list before the end of the show.

Sturtevant Activities

The B. F. Sturtevant Company is constructing a large addition to its aeronautical engine test house. This building has been designed to permit of the testing of eleven engines at one time. The extensive testing equipment is to be increased by the addition of a 300 H.P. Sprague Electric dynamometer.

Present contracts and allowances for future spares call for a production schedule and delivery of eight engines per week.

The weight of the Model 5A 140 H.P. engine dry is 3.7 lbs. per horsepower. Serious efforts are now well under way to reduce the weight still further and a reduction of at least twenty pounds will probably be announced within the next few weeks.

The Sturtevant Aeroplane Co.'s new assembly plant will be ready for occupancy about the middle of February. It is estimated that with the addition of this new building fifteen aeroplanes can be set up at once.

This company is now working exclusively on United States Navy and Army contracts, involving a large number of military biplanes, both land and water types, and high speed pursuit machines of the monoplane type.

The old Squantum aviation field has been leased for a long term of years and a large amount of money will be spent in developing and improving this land, which is practically the only available site within a radius of ten miles around Boston combining facilities for testing both land and water machines.

Army and Navy Orders

Capt. Robert H. Willis, Jr., aviation officer, 1st Aero Squadron, Signal Corps, to Fort Sam Houston, Texas, for duty. (Jan. 9, S.D.)

Master Signal Electrn. Thomas I. King, S. C., on duty in Washington, to Brooklyn, N. Y., for temporary duty in connection with aeronautics of the Army at the plant of the Sperry Gyroscope Company. (Jan. 25, War D.)

Sergt. 1st Class Horst W. Tittel, S. C., Fort Monroe, Va., to Mineola, Long Island, N. Y., for duty at Aviation School. (Jan. 24, War D.)

Sergt. 1st Class William C. Ocker, S. C., Signal Corps Laboratory, Washington, will be discharged by the Chief Signal Officer of the Army for the convenience of the Government. (Jan. 27, War D.)

Sergt. 1st Class William G. Martin, S. C., Mineola, Long Island, N. Y., will be sent to the factory of the Sperry Gyroscope Company, Brooklyn, N. Y., to receive instruction in the proper use and maintenance of the Sperry searchlight for a period not to exceed fifteen days. (Jan. 27, War D.)

Aeronautic Chief Urged for Cabinet

In a letter to President Wilson, Rear Admiral Robert E. Peary, Senators Johnson of Maine and Sheppard of Texas and Representative Kahn of California, members of the National Aerial Coast Patrol Commission, urge the addition to the Cabinet of a Department of Aeronautics.

They suggest that 1,000 hydroaeroplanes be acquired immediately for use on the Atlantic Coast, pointing out that they will increase the patrolling of this coast at least 300 per cent.

They recommend that arrangements be made to train 2,500 aviators for duty within six months' time and that 5,000 airmen, for both branches of the service, be instructed each year. It is further suggested that the President use his influence in having a great manufacturing plant, to be devoted to aeronautics, constructed in the interior of the country.

Manufacturers to Aid U. S. to Build Zeppelins

Promises of co-operation with the government in its efforts to develop satisfactory Zeppelin type aircraft for the Army and Navy was made by leading American aeroplane and rubber manufacturers at a conference in Washington, February 12, with Rear Admiral David W. Taylor, chief constructor of the Navy and head of the joint Army-Navy Board investigating the dirigible problem. A preliminary survey of the materials and plants available was begun. The manufacturers expressed belief that big aircraft similar to the German machines could be turned out.

It is regarded as probable that some method of centralizing the work will be necessary so that the facilities of all plants which can aid can be utilized. No definite plans were made, however, at this preliminary conference.

Representatives of the Connecticut Aircraft Company, the Curtiss Aeroplane Company and the Goodyear, Goodrich and United States Rubber companies were present. They united in offering to the government every aid in their power.

Officials view the Zeppelin problem more as a commercial than a scientific one. With the funds available and the co-operation of commercial plants they feel certain of their ability to construct ships that could duplicate the performances of the German craft.

Much information has been received from England and elsewhere as to the nature of Zeppelins brought down during the present war. Fragments of the frame of one destroyed near London have reached the Navy Department, showing the peculiar trussed girder construction of an aluminum alloy to reduce weight and yet secure rigidity. Since American automobile manufacturers have made rapid progress recently in reducing engine weight, it is felt that the efficiency of the German engines can be equalled.

Urges St. Louis As Aviation Base

"Biloxi has an opportunity of a lifetime to become an aviation base for the United States Government," declared A. B. Lambert, president of the Aero Club of St. Louis, vice-president of the Aero Club of America. Mr. Lambert has suggested to members of the Commercial Club to take steps looking toward having Senators John Sharp Williams, James K. Vardaman and Congressman B. P. Harrison use their influence in making St. Louis an aviation base and asking for an appropriation for such a purpose.

Mr. Lambert also stated that steps should be taken by the Biloxi Yacht Club to secure hydroplanes for their annual regattas, the local waters being amply situated for the operation of these machines.

Aviator Talks to Land Base by Radio-Telephony

For the first time in the history of American aeronautics radio-telephonic communication between a military aeroplane in flight and a land receiving station was established at the signal corps aviation school at North Island February 7.

The tests, held under the joint supervision of Captain Clarence Culver, holder of the world's record for long distance radio aeroplane communication, and E. J. Simon, New York radio engineer, were a pronounced success, according to officials of the school.

Flying at an altitude of eight hundred feet in a tractor biplane piloted by Captain Herbert Dargue, Captain Culver succeeded in transmitting several verbal messages a distance of approximately three miles. Captain Culver's voice came floating out of the blue sky as clear and distinct as though he was but a few feet distant from the receiving room.

Trouble was encountered with the belt of the aero fan, slung underneath the fuselage, when, traveling at eighty-five miles an hour, the suction of the wind caused the belt to slip off. The aero fan is to be supplanted by a quarter kilowatt generator driven by a two-blade propeller fastened to the lower wing section.

Within the next ten days Captain Culver and Mr. Simon expect to have little difficulty in engaging in extended conversation while flying in two distinct aeroplanes many miles apart. The War Department has set aside two Martin military tractors for radio telephonic experimentation.

Personal Pars

Art Smith will return to Japan on March 1st, to complete the schedule of flights which were interrupted by an accident during his last visit.

Katherine Stinson cabled the Aero Club of America from Japan stating that she held herself ready to return to America for military service should occasion demand.

Mr. Elling O. Weeks, the Eagle Grove, Iowa, aviator, took unto himself a wife last week.

Colonel Haan in Aviation School

Lieutenant Colonel William G. Haan, commandant of Fort Totten, Willets Point, will leave for San Diego, Cal., about February 15, where he will take a six weeks' course in aviation at the Signal Corps Aviation School. Colonel Haan will not operate the hydroaeroplane, but will be accompanied by a pilot. He will learn the mechanism of the machine and the methods of taking military observations from the air.

Under the new army bill ninety-six aeroplanes are to be built for work exclusively in the coast defences of the large cities of the United States. Sixteen of these will be assigned to New York City and probably will be stationed at Fort Totten. It is to tearn the co-ordination of aviation with the work of defending coast cities that Colonel Haan will take this course. He is regarded as one of the three or four leading authorities of the Army in coast defence matters and is taking the course at his own request to keep up with the advance in schemes for defences.

Dinner Given for Orville Wright

Orville Wright was guest of honor at a dinner given at Delmonico's by Grover C. Loening, formerly aeronautical engineer of the United States Army. The dinner was attended by officers of the aviation departments of the Army and Navy and aeronautical engineers and experts. The table was arranged in the shape of an aeroplane with Mr. Wright and Mr. Loening in the cockpit and the guests seated around the wings, fuselage, tail and rudder.

Mr. Wright, in one of the few speeches he ever has made, told of the hardships and discouragements he and his brother experienced in their early battles with the air.

"Our greatest difficulty, after we had solved the problem of flight, was in obtaining an efficient motor to drive the aeroplane through the air," he said. "After trying unsuccessfully in 1903 to obtain motors in this country and abroad which would develop sufficient horsepower and weigh less than 200 pounds we decided to build a four-cylinder motor ourselves. With this accomplished we flew the first machine that ever rose from the earth and under its own power kept in the air."

In speaking of what modern invention and progress have added to the fascinating industry he was generous in his praise of the men who have followed the air trail that he and his brother first blazed. "I have been astonished," he went on, "at the progress made in the development and refinement, as well as in construction and detail of aeroplanes, as shown by the many types exhibited at the Aero Show."

Aero Squadron to Remain Near Border

Plans for distributing the American expeditionary force after its withdrawal from Mexico, so that the border country made turbulent by bandit forays will be protected adequately against a repetition of the Columbus, N. M., raid, have been made. The First Aero Squadron has been assigned to Columbus.

Aeroplane manufacturers who attended conference in the Manhattan Hotel, February 13.

Sitting left to right: A. H. Flint, S. D. Waldon, F. Gates Porter, H. V. Mingle, Acting President; J. D. Cooper, F. L. Morse, Inglis Moore Uppercu and J. P. Tarbox. Standing, left to right: Capt. H. M. Weld, Tom W. Benoist, D. L. Meenan, Jr., W. E. Doherty, F. A. Faurote, J. Lansing Callan, Frederick C. Hild, Charles A. Herrmann, S. S. Breese, A. S. Heinrich, C. V. Van Husan and W. M. Blair.

Leading aeroplane manufacturers are holding their convention in the Hotel Manhattan, New York. This branch of manufacture at this time is of vital importance, and a gathering such as this promises much for the production of better machines. If trouble with a foreign power occurs it may be these very manufacturers upon whom the government will have to depend to rush machines for the defense of the country.

Ackerman Aeroplane Wheel Tested

Exhaustive tests of the Ackerman aeroplane wheel were made at the U. S. Army Aviation Field at Mineola, Long Island, on February 13th. The wheels were placed on a Curtiss J. N. military tractor, and some thirty landings were made on all kinds of ground and under as many conditions as possible. The pilots who took the machine up included Captain A. W. Briggs, Lieut. Smith, Instructor Leonard W. Bonney, and Instructor Bert Acosta.

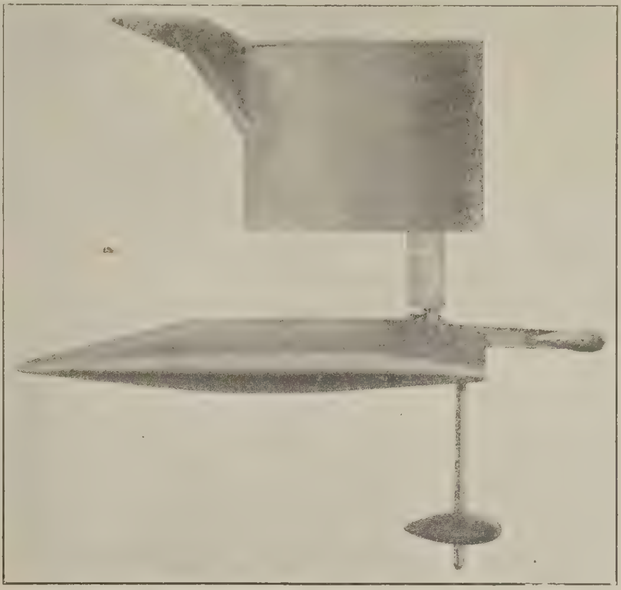
That Captain Briggs, who was conducting the tests, considered them highly satisfactory is borne out by the following letter which he sent to the Ackerman Wheel Co.:

> "In a test flight today (February 13) at the United States Aviation Field, Mineola, Long Island, I flew a Curtiss Type J. N.—4 Military Biplane No. 76, equipped with Ackerman Wheels.
>
> "The test was to determine the qualities of the Ackerman Wheel.
>
> "After making several landings in bad ground, stalling and drafting 5 to 6 feet upon several of the landings, and then taxing rapidly over very rough surface, I wish to say that the wheels proved to do all that was claimed for them and more, as their resiliency perfectly absorbed all shock before it reached the axle, causing the machine to hold the ground after a drop, and have little or no tendency to bounce as is the usual case in such landings. Over bad ground, the uneven surface was to all intents and purposes smoothed out, causing easy riding to the machine."

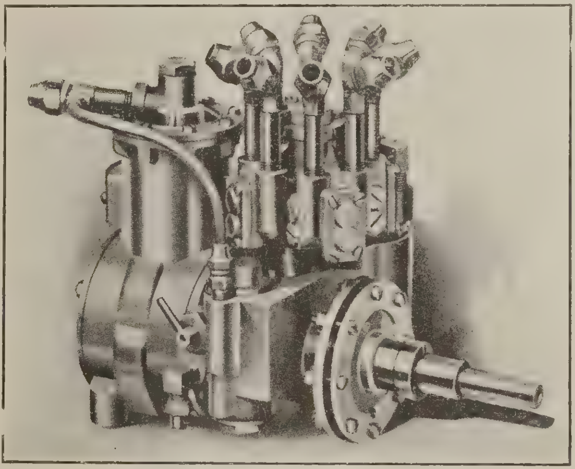
The tests were witnessed by members of the training corps at the Mineola field, by the Canadian purchasing commission, and by leading American aeronautic experts.

Capt. H. B. Wild, of the International Aircraft Co., of Chicago, who was also present, and who is one of the pioneers of aviation, was enthusiastic over the results of the tests.

The Ackerman Wheel Co. is now hard at work on large orders, and it is expected that large quantities will be used by the Government.



The Martin Aerodynamic Stabilizer, invented by Capt. James V. Martin, which aroused considerable interest at the Aeronautic Exposition.



The Christensen self starter, a necessary auxiliary of high power aviation engines.

The Curtiss J. N.-4, equipped with Ackerman wheels, which successfully withstood rough landing tests at the Mineola Flying Field on February 13.

SPEECHES AT EXPOSITION BY PROMINENT AUTHORITIES COVER EVERY PHASE OF AERONAUTICS

YEARS ago an automobile show was held in a small section of Madison Square Garden—a very small section—and this year the Automobile Show occupied four floors at the Grand Central Palace, while another was in progress at the Astor Hotel, and the same growth, though not so pronounced, was true in motor boating. But the first aerial show in this city has eclipsed both the other spheres of motor activities.

The entire main and mezzanine floors at the Grand Central Palace are occupied by the first Pan-American Aeronautic Exposition, which opened last Thursday night. The gate receipts amounted to more than $10,000 before the show opened. This far exceeds the first automobile and motor boat shows, and no other mechanical exposition ever had an advance sale amounting to anywhere near what the aero show had.

It demonstrates the popularity of the relatively new sphere of mechanical activity, and the present day international situation aided in making it the more popular.

The aeroplane, being an American invention, should be most popular with the American public, and after this show on education along the lines of the development of aircraft interest in this new field of activity will be greater than ever before.

During the Exposition each day was given over to the consideration of some special phase of aeronautical activity.

Aircraft Guns and Exploration Day

The entire afternoon on Friday was given over to the discussion and demonstration of the various aeroplane guns and their most important part in both automobile and aircraft defense. Laurence La T. Driggs, of the Driggs Ordnance Company gave an able address on this subject. The New Davis non-recoil gun, as constructed to gain the minimum weight desired for aero work, and to discharge from a rear as well as a forward barrel, thus relieving the re-coil force found so objectionable in the early aero guns, was demonstrated in moving pictures by A. J. Stone. Col. J. J. Dooley, of the Savage Arms Company, described and demonstrated the Lewis gun with the assistance of lantern slides. The Benet-Mercier, Colt and Vickers aeroplane guns were explained by their respective representatives.

At the Engineering Societies Building the subject of standardization was taken up in the afternoon, and a very interesting paper on the necessity of standardization of the thousands of small metal parts for aeronautic use was read by F. D. Diffin, of the Erie Specialty Company. Suggestions for standard tests for aeroplanes was ably discussed by J. J. Rooney, of the Wright-Martin Corporation.

In the evening Charles D. Walcott, secretary of the Smithsonian Institute, presided over the evening session at the Palace, when Robert A. Bartlett, the famous navigator of the "Roosevelt," of Peary's North Pole expedition, explained the advantages of employing aeroplanes for Arctic exploration. Dr. E. Lester Jones, Superintendent of the U. S. Coast Survey and Dr. Eric Mjoberg, were among the speakers.

In the Engineering Building at the same time Elmer A. Sperry spoke on "Aerial Navigation Over Waters," a subject vital to the present diplomatic crisis, and Professor F. W. Pawlowski, of the University of Michigan, gave a paper on the "Evolution of Aeroplane Wing Trussing." Motion pictures of aircraft in flight also were shown.

In the afternoon members of the National Advisory Committee visited the Exposition, among them Brigadier General George O. Squier, chief signal officer; Dr. Charles D. Walcott, Dr. S. W. Stratton, director general of the Bureau of Standards, Washington, D. C.; Rear Admiral Bradley A. Fiske, U. S. N., and others. Rear Admiral Fiske was the first high naval officer to ride in and to review a fleet from an aeroplane. This committee was met and escorted about the exposition by President Alan R. Hawley, of the Aero Club of America; Henry Woodhouse, Henry Wise Wood, Augustus Post, Everett J. Wendel and others active in the Aero Club.

These gentlemen were also met by a party of prominent South Americans including Consul General Fletcher, Vice Consul George William Chester, Commodore Huge A. Thomson, Dr. Alvare de Menezes, Commander Luiz A. Graca, Dr. Dimitri S. DeLavaud, all of Brazil; an Argentine delegation including Ambassador R. S. Naon, Consul Alberte H. Almiron Pedro Roth, Enrique Gil, Octavio Figueroa, Alfredo F. Lasso, Domingo Nougues, Alberta de Ibarra, and Chief of Argentine Naval Commission, Carlos Daireaux.

Delegations from Denmark, Great Britain and Cuba were also in the reception party, the former being represented by Count Frederick Moltke. Acting Danish Consul Hoffman Olson, Sephus Noble, editor of the *Danish Pioneer,* Dr. Max Honius, Carl Antensen, Michael Schibabye, Frede G. W. Rambusch, president of the American Scandinavian Society; Commander William Hovgaard, Halver Jacobson, Consulate James Madison, of Denmark.

Aeronautic Service and Collegiate Day

Saturday was collegiate and aeronautic day and men from Yale, Harvard and Columbia and other large institutions spoke in the convention hall. Large crowds visited the exhibit and became enthusiastic, as the atmosphere seemed to be charged with the preparedness spirit and talk of aerial defense was heard on all sides.

Dr. Charles D. Walcott, secretary of the Smithsonian Institution and chairman of the Executive Committee of the National Advisory Committee on Aeronautics, presided at the afternoon session. The speakers included Prof. Charles E. Lucke of Columbia University; W. Dubilier, radio expert, who organized the wireless system of the Russian army, and Phineas Varnum Stephens of the Georgia School of Technology.

The evening session was presided over by Rear Admiral Robert E. Peary, chairman of the National Aerial Coast Defense Commission. Addresses on introducing aeronautics in universities and colleges were made by Prof. Peabody of the Massachusetts Institute of Technology; Prof. E. N. Fales, University of Illinois; Prof. Charles T. Porter of Yale and Prof. Herbert Charles Sadler of the University of Michigan.

"This country had a surprise when the Deutschland raised its conning tower out of our waters," said Admiral Peary. "It had a shock when the U-53 sank several ships off Nantucket.

"Within thirty days we may have a thousandfold greater shock from the air, with ourselves as victims instead of spectators. Thousands of tons of high explosives dropped on this city or Boston or Charleston or Washington is certainly a possibility.

"Such an air raid," said he, "is no more impossible than the feats of the Deutschland or the U-53. To-day the man who believes nothing is impossible until it happens is a fool. If he holds a responsible position he may a little later be regarded as a criminal as well."

Admiral Peary's remarks were not limited to pointing out dangers. A constructive plan of coast defense has been for some time formulated in his mind—a plan which he presented on February 5 in the form of a memorandum to the President.

This memorandum, after pointing out dangers, suggested cures. He recommended first that the training of 2,500 aviators within six months and 5,000 within a year be made mandatory, and then declared that "to give the United States proper air power we need, in their order, the following:

"First—A separate independent department of aeronautics, with a place in the President's Cabinet.

"Second—An aviation class of thousands of young men throughout the country.

"Third—A comprehensive aero coast defense system of intercommunicable air stations along the sea fronts.

"Fourth—Some powerful interest which can combine and develop existing conflicting interests into a great air industry."

(Two steps toward the realization of this idea have already been taken. One was the unanimous recommendation of the House Committee on Naval Affairs that the government obtain control of the basic patents governing the manufacture of aircraft. The other was the formation last week of the Aero Manufacturers' Association—fifteen concerns, representing an investment of $30,000,000—banded together ready by their combined efforts to turn out for the nation 175 planes a week.)

"Fifth—A great central aeronautic plant, located in the interior of the country, where it can be protected to the last ditch."

Congress and Aerial Defense Day

Lincoln's Birthday was appropriately termed "Congress and Aerial Defense Day," particularly so as President Abraham Lincoln was the first to recognize the value of aircraft in warfare, as he commissioned Professor Lowe to provide balloons for the army, which were operated successfully before Richmond in the Civil War.

Official co-operation of the United States Post Office Department in the matter of establishing aerial mail delivery is now assured, and an important discussion of the subject of aerial delivery of United States mail took place in the convention hall of the aeronautic exposition. Bion J. Arnold, a member of the Naval Consulting Board and formerly president of the Chicago Aero Club; Charles Jerome Edwards and others made addresses. Alan R. Hawley, of the Aero Club, after making an address, received a letter from Second Assistant Postmaster General Otto Praeger relative to making the transcontinental aeroplane race next June an aerial mail route. The letter was read by Mr. Edwards in the course of his address. Appended to the letter was a list of thirty-seven aerial mail routes suggested by the Post Office Department. The letter in part was as follows:—

"In regard to aerial mail carrying, the department will take great pleasure in designing the route of the proposed transcontinental contest as an aerial mail route and will be glad to work out with your organization plans for experimental despatch of mails over the route, including the designation of such aerial mail stations as may be found practicable.

"The Post Office Department is highly appreciative of the public spirit shown by the men and women who have given their best efforts to a practical development of aviation and, thanks to this public spirit, many experiments in aerial mail transportation have been made, with profitable information to the department. These experiments have pointed out the lines along which the government itself ought to undertake a systematic aerial mail experimentation. To this end Congress has been asked to appropriate $100,000 for experimental aerial mail service."

Some of the thirty-seven routes proposed by the Department are the following: New Bedford, Mass., and Nantucket Island and via Woods Hole, air line distance 51 miles; Philadelphia, Pa., and Wilkescarre, Pa., air line distance, 102 miles; New York and Atlantic City, N. J., air line distance, 100 miles; Washington, D. C. to Atlantic City, N. J., via Baltimore, Md., air line distance 150 miles; Albany, N. Y., and Lake Placid, N. Y., air line distance, 112 miles; New York, N. Y., and Boston, Mass., air line distance, 190 miles; New York, N. Y., and Atlanta, Ga., air line distance, 740 miles; Key West, Fla., and Havana, Cuba, air line distance, 100 miles; St. Paul and Stillwater, Minn., via North St. Paul, air line distance, 13 miles; New Orleans, La., and Houston, Tex., thence to Galveston, Tex., with connection westward via San Antonio, Tex., air line distance, New Orleans to Houston, 320 miles; air line distance, Houston to Galveston, 56 miles; air line distance, Galveston to San Antonio, 255 miles; St. Louis, Mo., via Springfield, Ill., to Chicago, Ill., air line distance, 255 miles; New Orleans, La., via Meridian, Miss., and Birmingham, Ala., to Chattanooga, Tenn., air line distance, 480 miles; New Orleans, La., via Mobile, Ala., Pensacola, Fla., and Montgomery, Ala., to Atlanta, Ga., air line distance, 470 miles; Portland, Ore., and North Yakima, Wash., air line distance, 130 miles.

Alan R. Hawley, president of the Aero Club of America, presided over the meeting in the afternoon. Howard E. Coffin, who is chairman of the exposition, and also a member of the Advisory Commission of the Council of National Defense, gave a most interesting talk on "The Aeronautic Industry."

At the evening session Henry A. Wise Wood, chairman of the Conference Committee on National Preparedness, presided. Among those who delivered addresses were Rear Admiral Bradley A. Fiske, U. S. N.; Brigadier General George P. Scriven, chief signal officer, U. S. A.; Representative G. Murray Hurlbert, who spoke on "Aeronautical Legislation," and Rear Admiral Robert F. Peary, U. S. N., retired, who delivered an address on "The Aerial Coast Patrol."

In the course of his address Rear Admiral Fiske gave a most interesting description of the torpedoplane.

This new weapon, patented in 1912, is a device for the aerial launching of Whitehead torpedoes.

Ericcson invented the Monitor, that cheesebox on a raft, and it dominated the naval battles of the Civil War. The ironclad Merrimac sunk the Cumberland and the Congress, both carrying more men and guns than she. The Monitor saved the United States. The Zeppelin dominated until the perfection of anti-aircraft guns brought a stalemate. The submarine is the dominating weapon to-day. Undersea boats spell a nameless, hysterical terror because no effective counter-arm has been perfected.

Simply expressed, the idea is this: An aeroplane or hydro-aeroplane carries beneath it a Whitehead torpedo. The aviator, when six or seven miles away from the battleship he wishes to destroy, volplanes in the direction he wishes the torpedo to be fired. When comparatively a few feet above the water he pulls a lever. The torpedo is released and the starting lever simultaneously thrown back. The torpedo falls into the water, just as if it had been dropped from a destroyer, and having also the initial velocity of the 'plane. The aviator rises again. The torpedo speeds on to its mark.

The apparatus makes a trained army pilot with a $20,000 aeroplane a worthy foe for a $20,000,000 dreadnought.

Admiral Fiske has talked with naval officers and aviators alike. The navy men have declared that guns fired from a rolling warship could never hit a torpedoplane, especially if the 'plane be moving rapidly, neither overhead nor on the surface of the water. And aviators have said that they would find no difficulty in doing the work. To be put out of commission the torpedoplane would have to be struck in a vital place. Aerial battles abroad have proved that the wings of a tractor may be riddled with bullets without impairing the effectiveness of the craft.

So far this invention has shared the fate of many another example of American ingenuity. It has received praise without adoption. Many have declared that, especially in the light of the present situation, it should immediately be adopted by the navy. For it could be brought to a high state of efficiency within a short period of time.

Whether or not the navy ultimately tries the invention it will be tested. The 1st Aerial Patrol—a group of young Yale men headed by F. Trubee Davison, a son of Henry P. Davison, of the firm of J. P. Morgan & Co.—yesterday made known their determination to have constructed at once a torpedoplane. Tests will be made at Palm Beach, the headquarters of the unit.

Aerial Transportation Day

Tuesday was Aerial Transportation Day. Rear-Admiral Robert E. Peary presided at the afternoon session.

"Within the next few years every person in this audience will see the air full of mail carrying aeroplanes, coast defense seaplanes, from Eastport, Maine to Cape Flattery on the Pacific; business men flying from country homes to the city to work in the mornings and commodious landing places, on the roofs of hotels, railroad stations and public buildings," he predicted.

Admiral Peary, whose plan to have 1,000 aviators trained within six months, and 2,500 within a year, and to have a department of aeronautics created in the cabinet is now being considered by President Wilson, also declared that the Exposition will be an historic event, a veritable milestone in the progress of the world.

Henry Woodhouse in an illustrated address aroused enthusiasm and applause when he stated:

"New York City, with all its wealth and millions of people, is absolutely helpless to protect itself from aeroplane and dirigible bombs. There are here only 56 aviators who were trained by the Aero Club of America, and most of them are without aeroplanes to fly in. There are no anti-aircraft guns ready for instant use in this city, so far as I know, whereas the City of London alone has 400 anti-aircraft guns at all points within a radius of 200 miles."

Mr. Woodhouse also backed up the statement of Rear Admiral Robert E. Peary, chairman of the National Aerial Coast Patrol Commission, that the country needs at least 1,000 trained aviators at once, with 3,000 machines to go with them. The national need is so pressing that every effort should be made by the government to start training men by the wholesale at once in order to get these 1,000 aviators and 3,000 machines within six months.

Continuing, Mr. Woodhouse said: "All of our great coast and inland cities are equally helpless against attacks from the air. What this means can be faintly realized when we remember the pictures of havoc created on individual buildings in Paris and London, all of which has been done in spite of defense searchlights and anti-aircraft guns. Since we have no such things, enemy airmen can fly low with perfect safety and drop their deadly bombs with terrible accuracy. It is entirely possible that our great buildings in New York, Washington and Philadelphia will yet be demolished unless we get ready at once."

Hundreds of people prominent in society and public life visited the exposition and attended the meetings. Among the visitors on Aerial Transportation Day were Mr. and Mrs. Vincent Astor, Cornelius Vanderbilt, Theodore Roosevelt, Jr., Dr. and Mrs. Charles D. Walcott, Mrs. Charles A. Van Rensslaer, Mr. and Mrs. James K. Hackett, Lieutenant Commander G. V. Piotrowsky, naval attache to the Russian Embassy; Ralph Pulitzer, Herbert Pulitzer, Rollin White, Miss Alice Chittenden, Mrs. William A. Bartlett, Mrs. William H. Bliss and numerous others.

W. R. Blair, in charge of the Aerological Division of the Weather Bureau at Washington, D. C., spoke on "Meteorological and Aerological Conditions" testing upper air.

At the evening session Henry A. Wise Wood, chairman of the Conference Committee on National Preparedness, presided. Augustus Post gave a talk on the "Plans for the Transcontinental Aeroplane Contest, 1917." H. H. Salmon, of the Goodyear Tire & Rubber Company, spoke on "What we plan to do in co-operating with the Preparedness Movement." Raymond B. Price, of the U. S. Rubber Company, spoke on the "Rubber Industry for Preparedness," and C. F. Smyth, of the Connecticut Aircraft Company, delivered an address on "Developing Dirigibles for Commercial Purposes."

Aeronautic Industry Day

Wednesday was Aeronautic Industry Day, when Mr. Henry A. Wise Wood, president of the American Society of Aeronautic Engineers, presided.

Alan R. Hawley, president of the Aero Club of America, spoke on "The Need of Building Our Aeronautic Industry to Create Sources of Supply for Aircraft for National Defense."

Bernard H. Sandler delivered a most interesting address, "Legal Problems of the Air."

Charles Jerome Edwards, vice-president, Aero Club of America, spoke of what the Aero Clubs are doing and are planning to do to develop the aeronautic industry.

In the evening Messrs. Augustus Post and Henry Woodhouse addressed a special session of the New York Electrical Society.

Aerial Warfare Day

Joseph A. Steinmetz, president of the Aero Club of Pennsylvania, on Thursday afternoon delivered a most exhaustive lecture on Aerial Warfare, in the course of which he used many slides and motion pictures showing every phase of the application of aircraft in warfare. The meeting was largely attended and the audience was enthusiastic over Mr. Steinmetz's exposition of the subject.

THE GOODYEAR EXHIBIT

"Everything in rubber for aeronautics" has been the slogan of the Goodyear Tire & Rubber Company for the last six or eight years. To this end they have gathered together the best talent in the country and have done a vast amount of research work both in this country and abroad, and are now in a position to furnish the aeroplane manufacturers or the Government the finest aeroplane tires, tubes, rims and shock absorbers that can be designed.

In the lighter-than-air craft, the Goodyear Tire & Rubber Company has gone completely into the proposition. They not only are in a position to furnish the best fabric which years of experience as well as research work have been able to produce, but have also designed spherical and kite balloons, which in actual practice have been found to be superior to those being used abroad by the warring nations. Their spherical balloons have won almost all the National Balloon Races and have in addition, brought to this country the Gordon-Bennett Cup competed for in the last International Balloon Race in Paris.

Abroad the kite balloon, which is most generally used, has a sausage shaped balloonet, and in the early stages of the game the Goodyear Tire & Rubber Company built kite balloons along the most advanced lines known abroad, but it soon became evident that this type of balloon was quite unstable in a wind of any magnitude and had a great tendency to yaw and swing around in large circles. This naturally defeated the purpose of the observation balloon and it remained for the Goodyear Tire & Rubber Company to use its inventive genius to so construct a balloon that these defects might be overcome.

The kite balloon on exhibition at the Pan-American Aeronautic Exposition is the outcome of this work. The newest type can be flown without tail cups and will rise steadily at a point almost vertically above the winch.

The Goodyear Tire & Rubber Company have designed a winch which will be run by a small motor, and is so constructed that the cable cannot in any way be unevenly wound. It is of very light and very strong construction and can be easily placed upon a motor truck to be used in a portable kite balloon company.

Kite balloons are now almost universally recognized in nearly all modern warfare on land or sea. They are far and away superior to the old-fashioned captive balloon and even the aeroplane is usually but a clumsy and expensive makeshift in the kite balloon's particular province of range finding and general observation of the line.

The phenomenal development of the kite balloon during the present war has been large in spite of certain apparently inherent defects in the balloon itself. These have prevented its taking on a still wider field of usefulness. Notwithstanding its great superiority over the spherical balloon it still left something to be desired in the matter of steadiness. Even when loaded with tail cups the use of binoculars was of very uncertain value and accurate range finding was not absolutely possible under unfavorable conditions. The highest wind in which good observation could be made was about twenty-seven miles per hour. In addition to this the resistance was rather high, carrying the balloon over to a very sharp angle and seriously limiting the altitude which could be obtained, and at the same time placing a disproportionate strain on the cable.

All of these defects have been met in the new Goodyear type balloon by stream-lining the shape of the bag, by adding fins having a certain lifting power as well as counteracting the tendency of the balloon to yaw, and in place of the sausage-shaped balloonet a keel-shaped one has been devised which materially cuts down the resistance, and keeps the balloon steady. Observations have been made in this balloon in varying winds up to a speed of from thirty to forty miles an hour.

The Goodyear Tire & Rubber Company have also gone into the matter of parachutes, which are an absolute necessity as an accessory for kite balloons. With a Goodyear parachute it is a very simple matter to merely step over the edge of the basket and float slowly to the ground in the event of the kite balloon being punctured by enemy fire. These parachutes are constructed of a special fabric so taped and seamed that it is almost impossible for them to tear, and from their construction in case a tear occurs, it will be localized. They are twenty-eight feet in diameter and have a leather corset and thigh braces.

THE CURTISS AUTOPLANE

ONE of the greatest attractions at the Pan-American Aeronautic Exposition last week was the "Autoplane" exhibited by the Curtiss Company. Great secrecy surrounded the exhibit prior to the opening of the show, when it was formally "unveiled" before Governor Whitman and a party of distinguished visitors at 8:10 P. M., February 8th.

The machine is really a "limousine of the air," and compares favorably with the appearance and furnishing of the modern sedan or limousine. Upholstery and tapestries have been given much thought, and except perhaps for slight reduction in size, the car leaves nothing to be desired in appointment.

In performance, there is every reason to believe the machine to be quite practical, in spite of its bulkiness and the consequent rather high dead head resistance which it possesses. The body has been partially streamlined to reduce resistance, an advance over ordinary limousine design.

Apart from its unique appearance, special interest is attached to the machine because it is the first modern triplane that the average aero-enthusiast has had an opportunity of inspecting.

Above the front wheels is a small plane, extending from either side of the motor hood, carrying out the idea of mud guards.

General Dimensions

Span, upper two planes	40′ 6″
Span, bottom plane	23′ 4″
Chord, upper two planes	48″
Chord, bottom plane	42″
Gap between planes	39″
Stagger	11″
Height over all	10′ 0″
Length	27′ 0″
Motor, Curtiss OXX	100 h.p.
Speed range	65-45 m.p.h.
Useful load	710 lbs.

Planes

Wing curve is the "F-2"; planes at an incidence angle of 4°, and the lower plane with a 3° dihedral. Wing area, 420 sq. ft.

Struts are built up K-shape. Ailerons on upper and center plane.

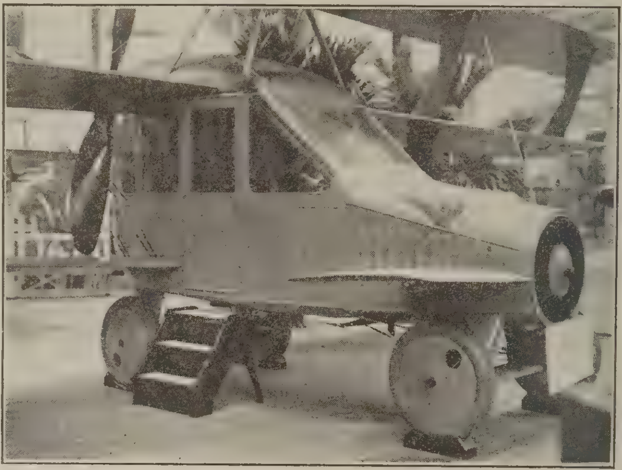
Sections of the top plane are joined at the center of the machine. Center sections attach at the top of body and lower plane sections are attached to the body about 6 inches above the floor of the car.

Body

Forty-two inches in its greatest width.

The body is of aluminum; windows of celluloid.

The motor is situated in the forward part of the body as in automobile practice, with a shaft extending to the rear of body, and power transmitted to the propeller located at the top.



Body of the Curtiss Autoplane

Seats are provided for a pilot "chauffeur" and for two passengers. Standard single Dep control is installed, arranged to steer the forward wheels at the same time as the rudder is moved.

The four wheels are sprung on concealed rubber shock absorbers.

Tail Plane

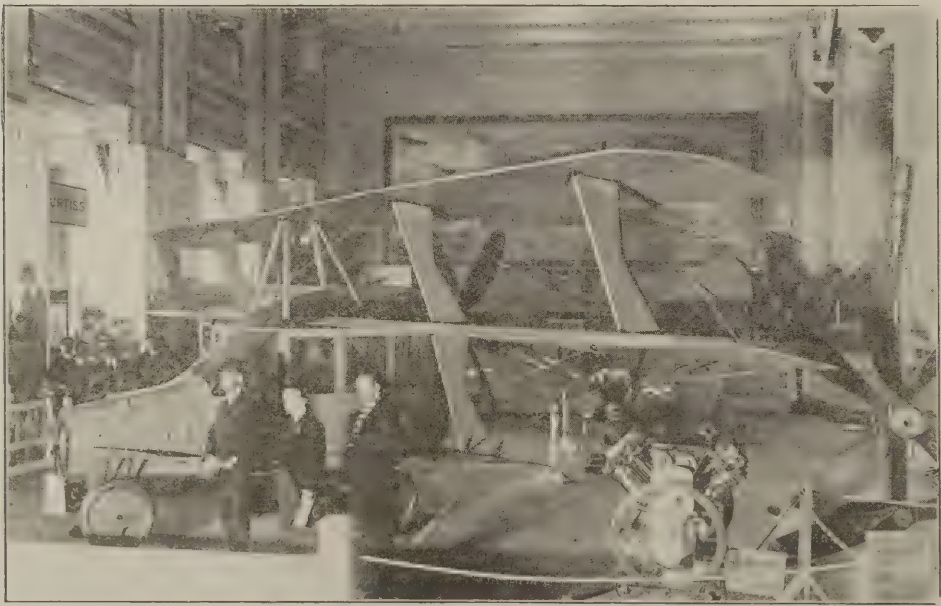
Two outriggers carry the stabilizing plane, elevators, fin and rudder, braced to outer struts of main plane by heavy cable. The outriggers are spaced 9′—0″ apart, allowing just enough clearance for the propeller. They are attached just above the central main plane.

Motor Group

The motor is a Curtiss OXX, 100 h.p. motor, turning at 1,400 r.p.m., and driving an 8′ 8″ four-bladed pusher type propeller with a 5′ 6″ pitch at a reduced speed of 1,100 r.p.m. The propeller revolves clockwise.

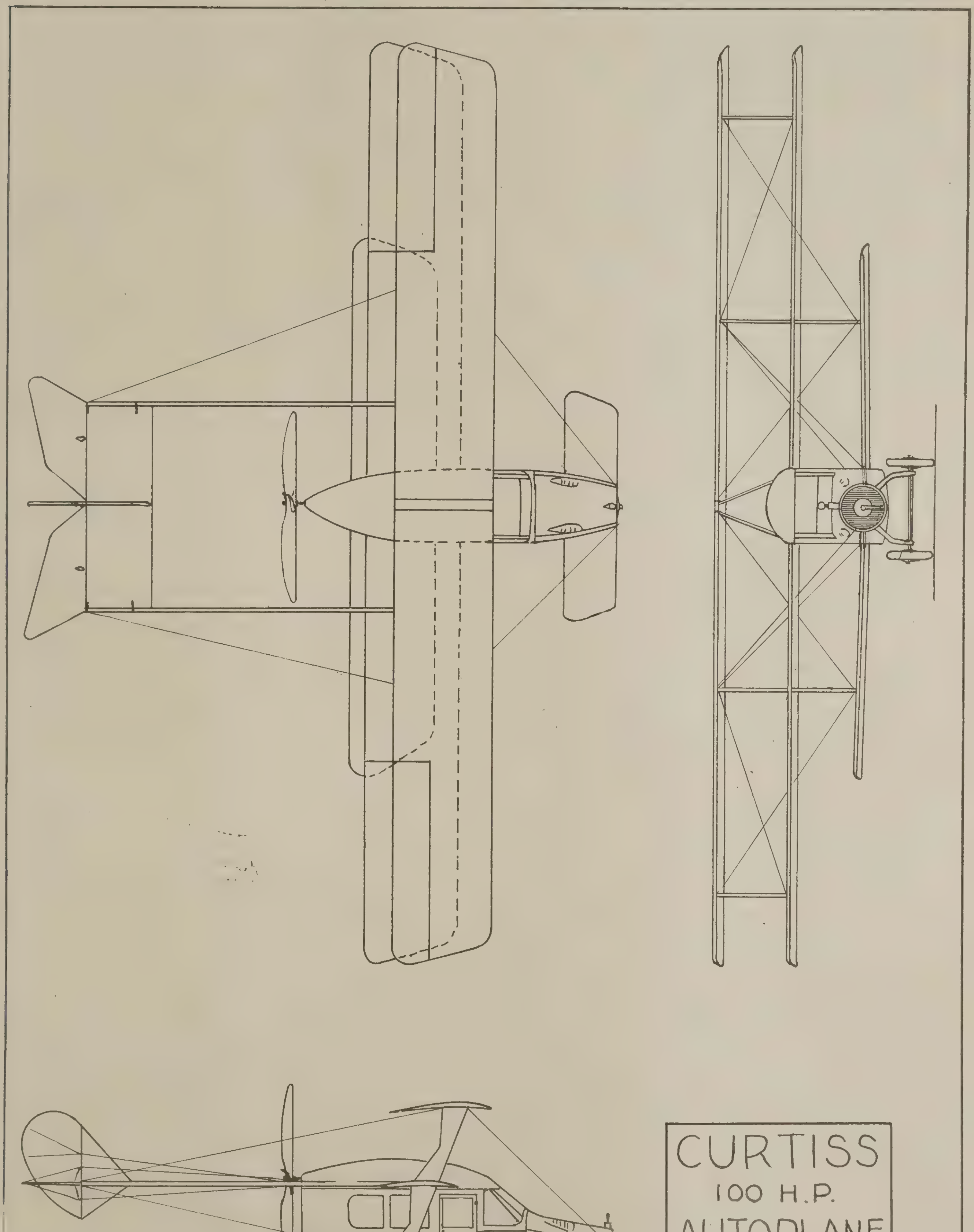
A circular radiator, placed as in automobile practice, provides cooling for the water.

The fuel tank is located at the center of gravity. It has a capacity of 30 gallons. The motor consumes 10 gallons per hour. Four gallons of oil are carried in the crankcase of the motor. Tanks are located in the space above the passengers' seats and just forward of the propeller.



The Curtiss autoplane which aroused so much interest at the Aeronautic Exposition.

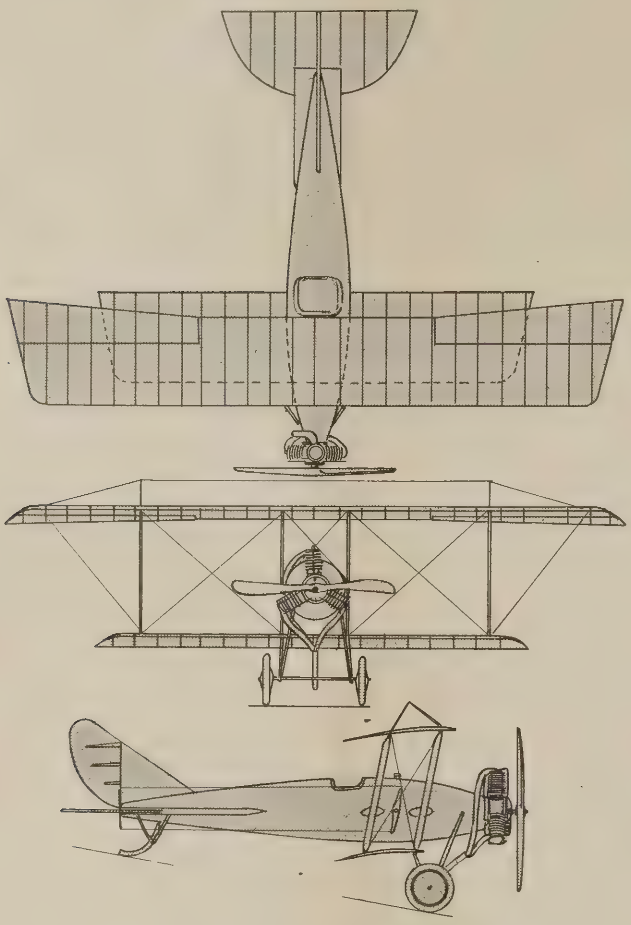
Standing in front of it are, from left to right: Rear-Admiral Bradley A. Fiske, Henry Woodhouse, and F. L. Faurote.


CURTISS
100 H.P.
AUTOPLANE
McLaughlin.

NEW TYPES AT THE EXPOSITION

S. S. Pierce Sporting Tractor

The little tractor exhibited by Samuel S. Pierce attracted admirers by reason of its neat design and the fact that it is adaptable for use by the sportsman. The fuselage is of smooth, circular streamline form, located above the lower main plane, and as the motor was made especially for the machine, the streamline effect is completely carried out.



General Dimensions

Span, upper plane	26′ 0″
Span, lower plane	20′ 0″
Chord	4′ 0″
Gap	5′ 6″
Area	182 sq. ft.
Length over all	20′ 0″
Weight, empty	630 lbs.
Weight, loaded and with 2 hrs. fuel	880 lbs.
Motor, S. S. Pierce Aero Corp	35-40 h.p.
Climbing speed, first minute	300″

The planes are staggered 12″ and are set at a 4° incidence angle. Ribs 12″ apart. Leading edge of lower plane 22″ above center of landing wheel, and there is 6″ of clearance between the lower plane and the fuselage

Wheels are 26″ by 4″ and are 4′ 4″ apart. The tail skid, held by steel tube braces and sprung on a universal joint, keeps the center of fuselage 26″ from the ground when the machine is at rest. The stabilizing tail is of the balanced type, and there are no elevator flaps. The tail is hinged on a flat projection which extends straight back near the rear of the body.

A triangular fin extends 53″ along the top of the fuselage and is 34″ high where the rudder is hinged.

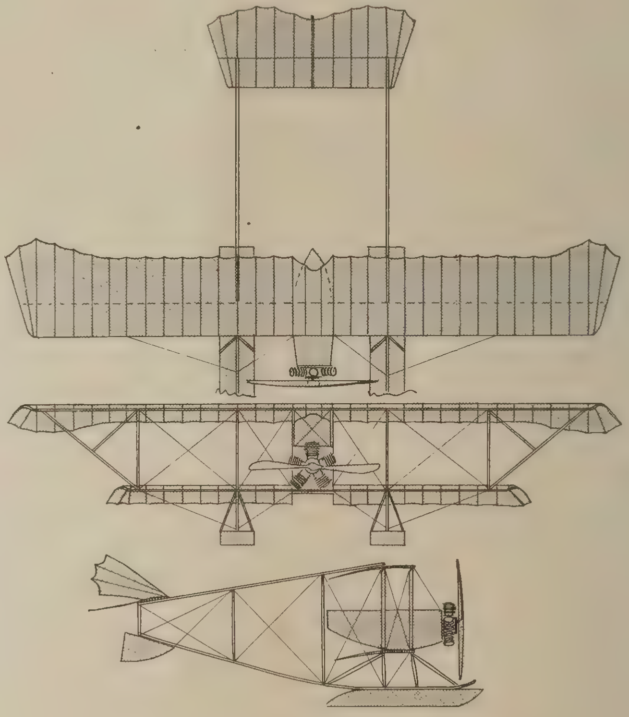
The motor is a 3-cylinder Y-type air-cooled Pierce motor, developing 40 h.p., and driving a Paragon propeller; 7′ propeller (3½′ pitch) at 1,400 r.p.m. Weight of the motor complete, 163 lbs. Bore, 4″; stroke, 6″.

Exhaust is led through nickeled pipes to a point below the lower plane.

Cooper Training Tractor

For training purposes, the neat little machine built by the John D. Cooper Aeroplane Corp. has many advantages. It

(*Continued on page* 671)

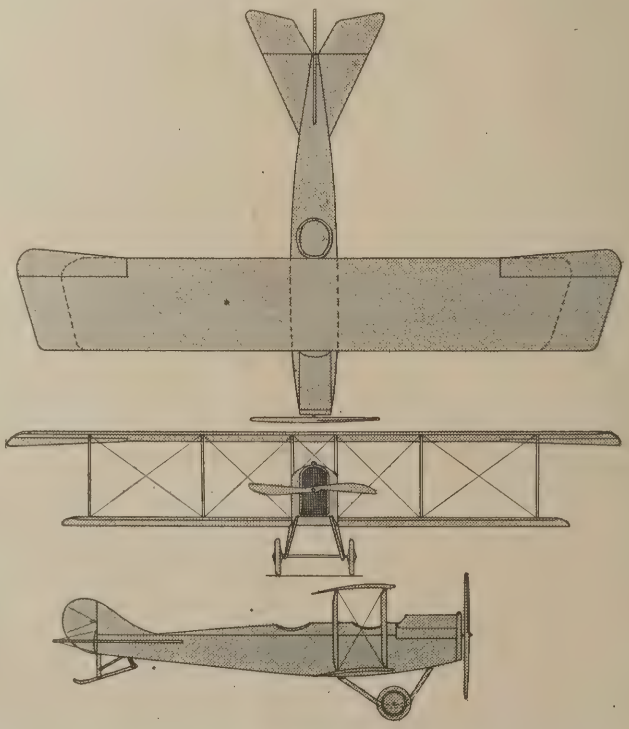


Witteman-Lewis Training Tractor

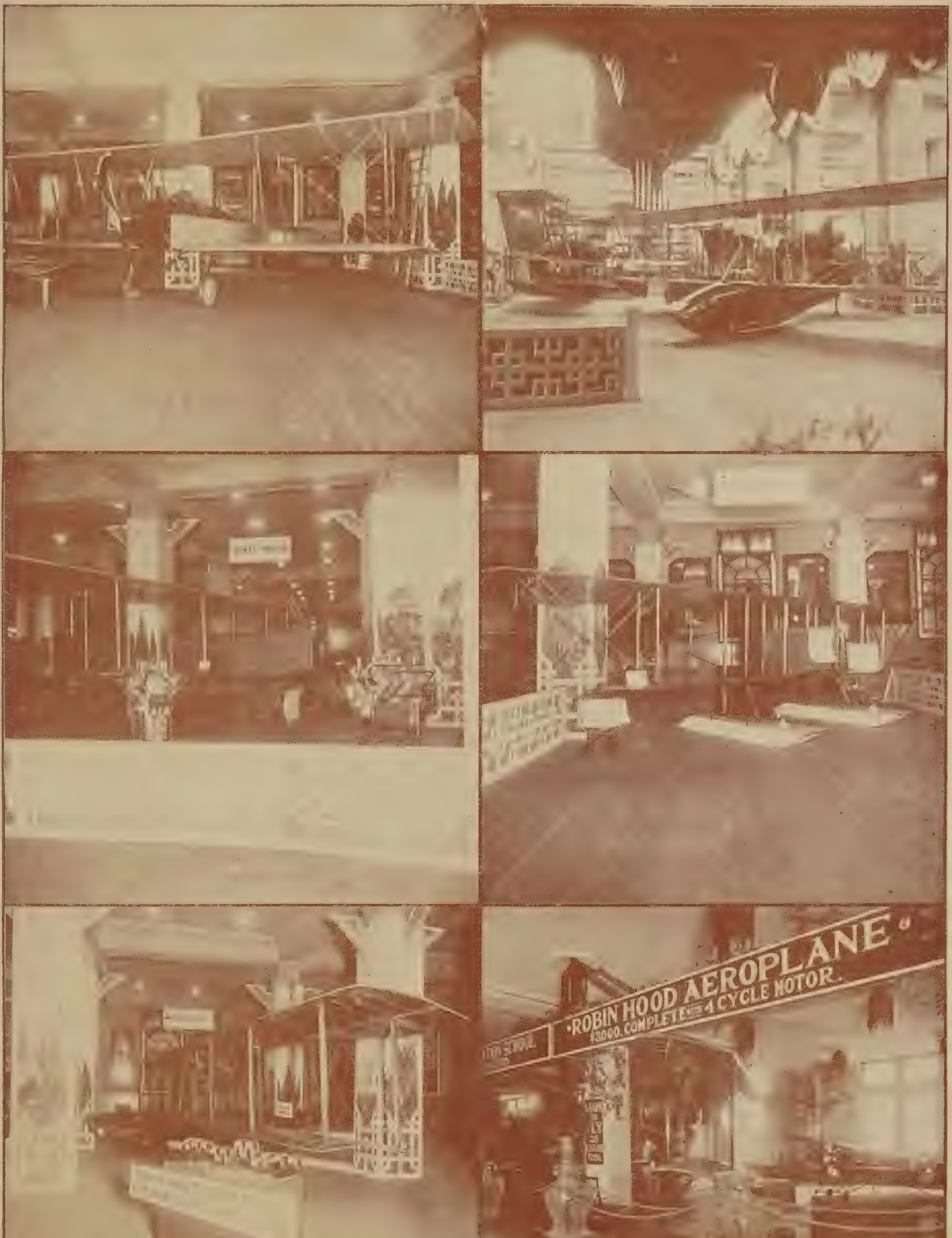
General dimension of the Witteman military training tractor exhibited at Grand Central Palace are as follows:

Span, top plane	42′ 0″
Span, bottom plane	34′ 0″
Chord	5′ 6″
Gap	5′ 10″

(*Continued on page* 671)



PAN-AMERICAN AERONAUTIC EXPOSITION EXHIBITS



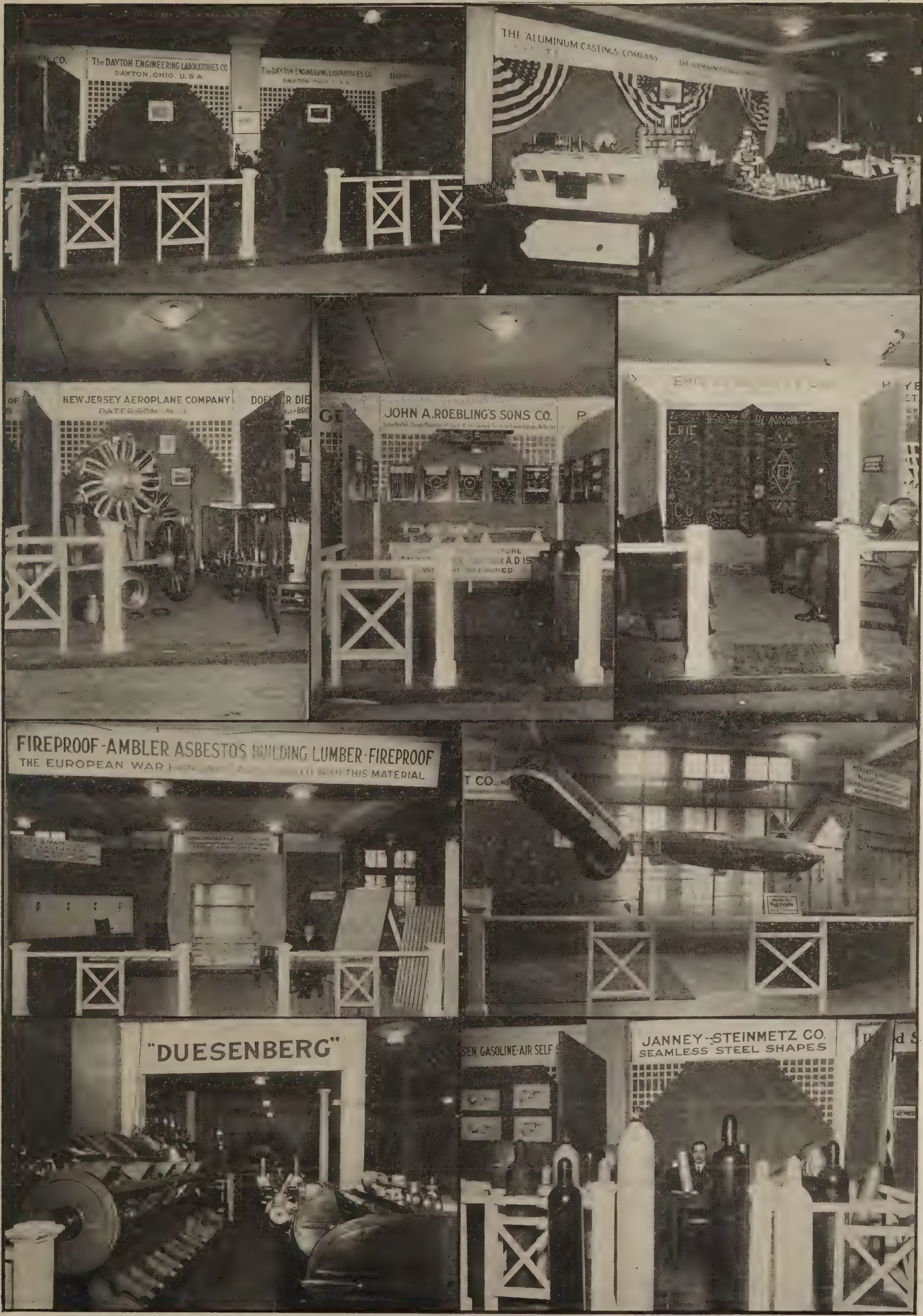
PAN-AMERICAN AERONAU

TIC EXPOSITION EXHIBITS

PAN-AMERICAN AERONAUTIC EXPOSITION EXHIBITS

IETY OF AUTOMOBILE ENGINEERS
STANDARDS AND RECOMMENDED PRACTICE
A.G. SPALDING & BROS.
PLANE COMPANY
AJAX AUTO & AERO SHEET METAL PARTS CO.
NEW YORK
The WOODWARD AERO-NAVIGATOR
FIREPROOF AMBLER ASBESTOS BUILDING LUMBER FIREPROOF
CORRUGATED WIRED GLASS
SKYLIGHTS

PAN-AMERICAN AERONAUTIC EXPOSITION EXHIBITS


The DAYTON ENGINEERING LABORATORIES CO
DAYTON, OHIO, U.S.A.
THE ALUMINUM CASTINGS COMPANY
NEW JERSEY AEROPLANE COMPANY
PATERSON N.J.
JOHN A. ROEBLING'S SONS CO.
FIREPROOF-AMBLER ASBESTOS BUILDING LUMBER-FIREPROOF
THE EUROPEAN WAR
THIS MATERIAL
"DUESENBERG"
JANNEY-STEINMETZ CO.
SEAMLESS STEEL SHAPES

SOME NOTES ON HIGH-PRESSURE AVIATION ENGINES*

By LEIGH M. GRIFFITH

In the endeavor to construct the lightest possible engines for aircraft, designers have in general followed one or the other of two tendencies in planning the design. The first, in point of time, is to assume large dimensions for the cylinders and use low gas pressures. This method permits a minimum section of metal for all parts subject to the stresses resulting from the gas pressures and also minimizes the difficulties of obtaining a satisfactory cooling system. The design has been largely followed in the case of air-cooled engines, and in most such engines has been made necessary by the limited intensity of cooling action possible by the ordinary methods of direct air-cooling. The later and much more promising method is to use smaller cylinders and employ the highest possible pressure, in the belief that a design on this basis will ultimately lead to a considerably reduced weight per unit of power.

In the early days of aeronautic engines, in order to obtain any endurance at all worthy of the name, it was absolutely essential to adhere to the low-pressure type of design, since, entirely aside from the question of satisfactory cooling, it was impossible to obtain any ignition--means that would meet the requirements of aviation engines unless the gas pressure was kept low. This is well appreciated to-day since even now the greatest single source of trouble lies in the spark-plugs; these fail, not so much because of oiling conditions as from insulation and electrode deterioration due to the combination of high and variable temperatures and pressures. The low-pressure large-volume type of design received an immense impetus from the almost exclusive success of the Gnome engine, which was of course a particularly shining example of such construction, as were also the early Renault engines.

EXAMPLE SET BY AUTOMOBILE RACING ENGINES

This was the line of least resistance and designers of new engines largely followed the example set by the designers of the two types mentioned. However, the experience obtained by those engineers who had been engaged in the design and operation of racing automobiles, the engines of which were at an early date limited in the maximum cylinder dimensions, showed that a satisfactory power plant could be built using much higher compression pressures than the majority of aeronautic engine designers had thought possible.

Some automobile companies with considerable racing experience assumed that it would be an easy matter to produce a satisfactory aviation engine by the comparatively simple method of slightly altering their successful automobile racing engines and decreasing their weight. While many of these latter did not succeed in producing anything permanent, the result was to bring into the list of engineers working on the aviation engine new men whose experience led them to adopt the high pressure type of design.

HIGH AND LOW PRESSURE ENGINES

I would place the dividing line between the high and low pressure engines at about 100 lb. per sq. in. brake m.e.p. for the four-cycle type, and at about 75 lb. for the two-cycle type. Such a division would place the majority of the modern successful engines, especially of the water-cooled type, in the high pressure class. Comparatively little has been done in the case of the two-cycle type, so that data for the discussion of this type are extremely meager. Nevertheless, I blieve that this type offers considerable promise of eventually surpassing the maximum power-weight ratio that it is possible to obtain from the four-cycle type owing to the apparent ease of obtaining brake mean effective pressures considerably more than half as great as in the case of the four-cycle type.

Without entering into a detailed discussion of the matter, it may be taken as generally true that for a given design of engine, operating at a given piston-speed, it matters little whether the power is developed in large cylinders operating under a low mean pressure or in small bore cylinders with high mean pressure. In either case, considering the effects of gas pressure alone, the stresses on all members below the cylinders and pistons is not affected by the difference in mean pressure, providing the total power developed is held constant. This is true because the constant piston-speed necessitates the total piston pressure also remaining equal, regardless of the piston diameter. The cylinder therefore is the principal element affected by any alteration of the brake mean effective pressure, the piston and valves being affected in a lesser degree. As the weight of the cylinders constitutes a considerable part of the total weight of any aeronautic engine (Winkler, the German authority, places the percentage at about 28 as a water-cooled engine average, which is 5 per cent greater than for the crankcase), it is believed that a consideration of the weight reductions possible of realization by the adoption of the highest mean pressures would be of considerable interest to designers.

If we assume that the maximum gas pressure bears a constant ratio to the mean effective pressure, as is at least approximately true, and we further assume, for the purpose of illustration, two engines whose mean pressures bear the relation of two to one, we see that the low pressure engine must have twice the piston area of the high pressure unit if they are to develop the same power at the same piston speed. This means that the low pressure cylinder must have a diameter 41 per cent greater than that of the high pressure cylinder. Working from the standpoint of the stresses resulting from the gas pressure alone, it follows that the annular cylinder-wall sectional-area must be the same for the two cases since the stress in it is equal to the total piston pressure, which is equal from the conditions assumed. The bursting pressure in the transverse direction, being taken by two thicknesses of the cylinder wall, requires a thickness in the case of the low pressure cylinder of 71 per cent of that of the high pressure one; this again gives roughly the same cylinder-wall weight for the two cases.

While this reasoning indicates no weight saving for the high-pressure cylinder-barrel, it must be remembered that we are considering stresses resulting from the gas pressure alone, and that the thickness of cylinder walls required in practice is considerably greater than would be necessary to care for such stresses. The reason is that some extra metal is required to care for the stresses due to the distorting effect of the temperature differences in the various portions of the cylinder unit. The increase in thickness is necessary to give sufficient rigidity for the cylinder walls to retain their circular shape to a satisfactory degree. Considered from this standpoint, it seems inadvisable to make the thickness of the lower pressure barrel any less than that of the high pressure one, especially when it is remembered that its diameter is at the same time 41 per cent greater. In practice, the low pressure barrel is probably the thicker, owing to its larger diameter and consequent greater liability to heat-distortion.

DESIGN OF JACKET WALL

The jacket-wall thickness in a cast cylinder is more or less determined by the foundry requirements and is probably somewhat greater in the case of the larger cylinder diameter. An applied jacket is also thicker for the large cylinder on account of the greater area of unsupported surface. Even with the same thickness of water space, the water weight is less for the small cylinder, but as more heat has to be transferred per unit of area in the case of the small cylinder, the water velocity should be higher so as to provide a more energetic scrubbing action on the cylinder walls. This calls for a thinner jacket space on the high pressure cylinder, thereby further reducing the weight of the jacket water. The thickness of cylinder and piston heads is about 26 per cent greater for the large low pressure unit; according to the Bach formula, for identical material, stress and design, this thickness varies not only as the cube root of the pressure but also as the three-fourths power of the radius of the unsupported circular plate area. While this is not strictly true in practice, on account of these elements being generally of dome shape or ribbed, it at least serves to indicate that the weight balance is considerably in favor of the small high pressure design.

The enclosing walls of the combustion and expansion chambers must be considered also from another point of view than that of merely containing sufficient metal to resist the pressure and heat-distortion loads. Inasmuch as about one-half the total heat developed by the combustion of the fuel has to pass through these walls to the jacket water, it is necessary to consider the effect of this on the wall thickness. In the case of the high pressure unit, we have nearly the same total amount of heat to dispose of as with the low pressure unit, but, assuming a stroke bore ratio for the former of two and the same stroke for both, the total wall area available through which to pass this heat is not over 60 per cent as great for the high pressure unit as for the other. Consequently, the unit intensity is some 65 per cent greater, which means a higher wall temperature on the gas side and consequently a greater liability to preignition trouble, unless the cooling water is maintained at a correspondingly lower temperature, thus necessitating an increase in the radiation capacity.

THERMAL RESISTANCE OF CYLINDER WALLS

The best method to counteract this difficulty is to diminish the thickness, or rather the thermal resistance, of the walls somewhat in inverse proportion to the increase of unit heat-conduction capacity required. Such a method, however, involves the use of a higher grade of material for the cylinder walls and demands a greater attention to the problem of allowing the cylinder walls the greatest amount of freedom to expand in all directions under the influence of heat so that the minimum restraint is offered to such movement. It is this restraint that distorts the walls from their original form. It is also necessary to insure a more uniform cooling action of the circulating water, to the same end.

The use of a higher grade material is in itself a considerable advantage from the weight-reduction standpoint, but of course is equally applicable to the low pressure unit. The use of automobile-type cast-iron cylinders for aviation engines, with either integral or applied jackets, is gradually but surely disappearing, for reasons that are well understood. Just now, the popular tendency is to use some form of cast aluminum-alloy cylinder with either a steel or cast-iron liner. This general type of construction is appearing in the individual as well as the block-cylinder form, but it seems to the author to be poorly adapted to the requirements of the really high pressure engine because of the unavoidable fact that the total resistance to the conduction of heat through the walls is greatly increased by the lack of continuity of metal at the joint between the liner and aluminum wall, and also by the considerably increased total thickness of metal. It certainly appears that lubrication is rendered more difficult and the risk of preignition increased from this cause.

A better arrangement, from the heat-disposal and weight standpoints at least, is that wherein the jacket water comes in direct contact with the steel liner. In the latter case, the liner can be screwed into the combustion chamber at its upper end so that the combustion chamber is a part of the aluminum block casting, or the liner can have a closed head-end forming the combustion chamber and with the valves seating directly on the liner material. In either case the cooling would be good, except at the screwed joint mentioned or at the points at which the valve or spark-plug passages emerge. It is difficult to avoid an undesirably heavy section of metal tending to accumulate heat at such points.

The ideal cylinder has the thinnest possible wall consistent with the maintenance of a satisfactory degree of rigidity; is so designed as to permit the greatest freedom of expansion and contraction under the influence of temperature changes, has uniform wall thickness throughout; and is provided with a water jacket of such design as to give a uniform cooling action over all parts of the cylinder wall. The basic idea is to make sure that each unit of area of heated surface of the combustion chamber and cylinder wall is separated from a like unit of area of uniformly cooled surface by a wall of minimum uniform thermal resistance. Of course, in the case of the piston and valve heads this cannot be done, since these members have to conduct the heat received largely to their surfaces of contact with the cylinder metal, in order to transfer it to the cooling water. In the piston, this is best accomplished by using a metal of high conductivity and a design that provides ample sectional area to conduct properly the heat from the head to the skirt, from which it passes through the oil film to the cylinder wall.

PROPER PISTON MATERIAL

An aluminum alloy is by far the best material to use for high-pressure piston construction, mainly because of its high heat conductivity

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* Paper read before S. A. E. Meeting February 9.

—some three to four times as great as either cast iron or steel—but also because its low specific gravity brings about a considerable reduction in the reciprocating weight and inertia forces. Attention has been previously called to the increased intensity of heat absorption in the case of the high pressure unit, but this is almost offset in the case of the piston by the reduced diameter and consequently reduced distance for the heat to travel. The inlet valves will give no heating troubles, if of ordinary conventional design, because the incoming charge serves to keep their temperature well below the troublesome point. The exhaust valves, however, are a prolific source of trouble, owing to their being in contact with the hot gas for such a considerable part of the time. For high pressure units, these valves must be kept much cooler than for low pressure ones, and, since all the available valve-head materials have about the same thermal conductivity, the only means at hand for keeping the temperature low is to use small diameters, thick heads, large well-guided and cooled stems, and fairly wide seats on a well-cooled surface. All of this will tend to increase the valve weight and will lead to the more extensive use of four or more valves per cylinder.

It seems to the author that there can be but little question as to the one best cylinder construction for the aeronautic engine working under the highest brake mean effective pressure. It is that in which the cylinder units are built up in pairs or blocks from alloy steel parts flame-welded together into one integral whole. A number of advantages are inherent to this form of construction, such as the following: the absolute minimum thickness of metal is required to resist the stresses due to the pressure and thermal effects, which makes for light weight; the minimum thickness of metal wall interposed between the hot gases and the jacket water and the absence of masses of metal tending to accumulate heat make for uniform and effective cooling of all interior surfaces by water of fairly high temperature; assurance of the homogeneity and character of the material composing the cylinder elements; a definite knowledge of the form and thickness of all walls; the greatest facility of inspection and testing of all joints during the assembling operations,—all of these make unnecessary any arbitrary addition of metal in the endeavor to allow for possible unknown weaknesses.

WEIGHT REDUCTION WITH BEST CYLINDER CONSTRUCTION

The author has built 4⅝ by 7-in. cylinders by this method, of nickel and carbon steels, in pairs, that weighed only 24 lb. per pair, or 9.8 cu. in. displacement per pound of weight. These cylinders are on an engine that on official test showed a brake mean effective pressure of more than 116 lb. per sq. in., which is believed to constitute a record for aeronautic engines. The hydrostatic test-pressure for inspection was 1000 lb. per sq. in. The cylinders were provided with four valves and two spark-plugs each. The jacketing was complete, even extending to the inlet and exhaust flanges as well as completely around the valvet-seats and plug bosses. The fact that these light cylinders stood the high temperature and pressure without distress or heating troubles certainly proves that it is absolutely unnecessary to adopt a heavy construction for these conditions.

In comparison, it may be stated that the 4⅞ by 7-in. cast semi-steel cylinders of a recently announced aeronautic engine weigh 51 lb. per pair, or 5.1 cu. in. displacement per pound, without the cast aluminum covers that close the jacket spaces; and this is only a two-valve engine. Another aeroplane engine, also recently announced, has built-up steel cylinders with cast aluminum jacket covers; the 4 by 6-in. cylinders weigh 40 lb. per block of three, or 5.65 cu. in. displacement per pound. This is also a two-valve design, and both descriptions have recently appeared in the technical magazines.

Insofar as its effect on the type of cylinder construction employed is concerned, it matters little whether the engine is laid out as a geared-down short-stroke job or a direct-drive long-stroke, except for the comparatively slight saving due to the shortened barrel length in the first case. However, the author is convinced that the greatest power-weight ratio can be obtained in the direct-driven engine; this is borne out by the fact that the lightest water-cooled engine so far officially tested, to the author's knowledge, is the one incorporating the above-mentioned light weight cylinders. At the moderate speed of 1325 r.p.m. this engine showed a weight of only 2.65 lb. per brake horsepower; this weight included the two magnetos complete with all wiring and plugs, the two carbureters and manifolds, all water headers and a particularly powerful pump. However, it did not include the weight of the propeller-hub, starting-crank, exhaust headers, or the contained water and oil. It would seem as if the most simple and direct method to obtain a sufficiently high piston speed in combination with a propeller speed that will come within the zone of high propeller efficiency is to adhere to the long-stroke direct-driven design in which the propeller is carried on an extension of the crankshaft. Certain it is that the total inertia forces of the reciprocating parts for this method are less by a considerable amount than those in the shorter-stroke geared-down engine.

BETTER SPARK-PLUGS NEEDED

Spark-plugs are perhaps the greatest source of trouble in the high pressure engine. If the threaded portion of the shell makes good contact with a well-cooled surface, no trouble is to be expected from the shell itself over-heating. However, the grounded electrode must be of sufficiently high heat conductivity and must have a sufficiently good thermal contact with the shell to ensure that the heat received will be carried to the shell and then to the jacket water. The section of these electrodes should increase from the sparking point to their anchorage in the shell, and should not be flattened or deformed so as to offer a relatively large surface for the absorption of heat from the gas. The center electrode usually gives the most trouble from over-heating. This is to be expected since the heat received by it has to be conducted in a large measure through the insulator to the plug shell. Very little heat is conducted to the air lengthwise of the stem, owing to the small size and length of this member. Perhaps the situation can be helped by the development of an insulating material having a higher heat conductivity in proportion to its electrical conductivity than the materials now in use. The greatest improvement is to be looked for along the lines of electrodes with higher heat conductivity, greater sectional area, and perhaps thinner insulators having more intimate contact with both the electrode and shell. The recent idea of introducing a small amount of air or mixture direct to the plug cavity, in such a manner that it washes both the center electrode and insulator, may prove to be a considerable aid.

In an engine developing a high mean effective pressure, necessarily a high volumetric efficiency and a high compression pressure are required; these in turn demand efficient cooling, scavenging, charging and ignition. The cooling requirements have been mentioned and consist fundamentally of the uniformly energetic circulation of the cooling water over a cylinder wall of the highest possible uniform thermal conductivity. The thorough scavenging required in the high pressure unit is aided by the high compression ratio, which implies a small compression chamber to retain the residue of the burnt gases. Both scavenging and charging-betterment demand ample gas passages of minimum resistance, which can be best obtained with multiple valves opening into stream-line ports of the shortest length and least turns. All of this is well understood, except the necessity for more than two valves.

ADVANTAGE OF MULTIPLE VALVES

The author believes that only by the use of multiple valves of moderate diameter can we get the highest volumetric efficiencies and compressions at the same time, since the extreme difficulty of keeping the center of large exhaust-valve heads sufficiently cool to eliminate pre-ignition with the high compression will compel the adoption of the small valve. In the case of the inlet valves, ample area of gas passage is of greater relative importance because of the low pressures available to produce the gas flow. This ample area is more easily attained with the multiple valves. In addition, the latter arrangement tends to reduce the inertia of the valve system.

Ignition for the high pressure engine demands far greater attention than for the low pressure unit. The increase of compression increases the rapidity of inflammation somewhat; the reduced size of the compression chamber further shortens the time of total ignition; yet in order to obtain the highest rapidity of inflammation required for the development of maximum mean effective pressure, it is necessary to ignite simultaneously the mixture from two or more points as widely separated as possible. This should preferably be done by separate and distinct ignition systems, because of the greater reliability afforded by such an arrangement. Spark-plugs should be so located as to receive the maximum cleaning and scouring effect due to the passage of the incoming charge over the plug electrodes, both on account of the cooling effect on the electrodes and insulator and in order to insure that the plug cavity is filled with fresh mixture that is circulating with the greatest turbulence. Care must be taken that plugs are so arranged that these actions are as near alike for all plugs as is possible, in order to insure synchronism in the ignition.

AUTHOR'S CONCLUSION

An endeavor has been made in this paper to outline a few of the reasons for believing in the ultimate superiority of the high brake mean effective pressure engine for aeronautics, and also to give some of the solutions for the difficulties encountered. It is hoped that those who are interested in the development of aviation engines will object to some of the statements made and thereby promote discussion of the problems.

U. S. Rubber Exhibit

The United States Rubber Company displayed a complete and distinctive line of balloon fabrics and mechanical sundries for aeroplanes, consisting of shock absorbers, gasoline hose, rubber matting, together with shoes and clothing for aviators.

For three-quarters of a century the United States Rubber Company has been manufacturing rubber products, and it is fitting that their laboratory should be countless experiments and exhaustive tests develop the materials most suitable for the demands of this comparatively new industry.

World-wide interest is being evinced in aeronautics, due, no doubt, to the stimulus it has received from the use of aircraft in the European conflict, therefore, the United States Rubber Company thinks it desirable that the public should be informed that this company has kept pace with recent developments, and that the requirements of manufacturers and aviators for a dependable line of rubber products can be filled.

At this company's exhibit in booths 226-228, on the second floor of Grand Central Palace, they showed aviators' clothing that by test is warm, windproof and waterproof.

In manufacturing balloon fabrics, special attention has been given to the three primary requirements: weight, strength and gas-tightness. A complete line of these fabrics will be exhibited.

A comparatively complete assortment of mechanical sundries, consisting in part of indestructible gasoline hose, shock absorbers, aeroplane cord, rubber matting was also on exhibition, and special representatives of the Aeronautical Department were on hand to explain the merits of the various products.

The Berling Magneto

The Ericsson Manufacturing Company exhibited at the show a complete line of their Berling magnetos especially adapted to aeronautical use. These types consist of the D-81 8-cylinder independent single spark type, used on the Curtiss and other aeroplanes. Two of these magnetos are used on the large Curtiss motors and one on the smaller motors.

The Berling D-88 magneto was also shown. This is an independent 8-cylinder double spark magneto intended for 8-cylinder motors where two-spark ignition is desired, where it is undesirable or not feasible to employ two separate magnetos.

For 12-cylinder aeroplanes, the different 6-cylinder types were shown. These consist of the DD-66 dual two-spark magneto, the DD-61 dual single spark magneto, and the D-61 independent single spark magneto.

In addition to exhibiting these various types of Berling magnetos, there were shown in animated pictures the actual construction of a magneto in the factory. This also showed many of the very interesting and severe tests which all raw material and parts must pass before they can be used in the completed magneto.

The Radio Exhibit

At the Exposition serious consideration has been given to radio equipments for aeroplanes and balloons. A large space has been set aside for the exhibition of different types of sets, such as are used now in the European countries for directing the artillery from aeroplanes for interfering with stations and for long distance communication to be used by observers. Models of the different types of wireless equipments using direct and alternating current generated by small dynamos which get their power from the air by means of a small propeller. The Marconi Company have been invited to exhibit the set which was recently purchased by the Navy Department for hydroaeroplanes. This instrument has one K. W. capacity and it is stated that up to 300 miles will be obtained. That is to say, the aeroplane can signal for a radius of 300 miles. The total installation wil come within 100 pounds. Other sets made by the Sperry Gyroscope Company, De Forest Radio Telephone & Telegraph Company, William Dubilier, Wireless Specialty Apparatus Company, Cutting & Washington, Manhattan Electric Supply Company and Mr. A. F. Cole. The wireless operators were supplied by the East Side Y. M. C. A. under the direction of Mr. Boehm.

FOREIGN NEWS

BELGIUM

Amsterdam, Saturday, via London.—The *Telegraaf* says that a fleet of aeroplanes at dusk yesterday attacked the Belgian coast town of Zeebrugge. The Germans fired 300 shells from anti-aircraft guns in an attempt to drive off the attackers.

FRANCE

Paris, Feb. 10.—The report cabled yesterday that Sergt. Ralph Lufberry of the American Air Squadron, had brought down his seventh aeroplane and has received the Legion of Honor cross is confirmed.

Since then it is probable that he has destroyed his eighth machine, but that is unofficial.

Although accomplishing these feats, Lufberry is so crippled from rheumatism he is barely able to walk.

Lieut. William Thaw has returned to the Lafayette squadron with one of the fastest biplanes on the French front.

Paris, Feb. 11.—The possibility of the appearance of American naval vessels in European waters to protect American shipping from submarines is discussed here, and it is pointed out that torpedo boats, destroyers or other craft assigned to this task would require the co-operation of hydroaeroplanes as scouts to locate the underwater boats. The efficiency of this style of hunting submarines has been demonstrated.

One of the organizers of the Lafayette Corps of American aviators in the service of the French army, according to *The Paris Herald,* has received many letters from volunteers in training in France offering their services in this work on condition that arrangements could be made with the French military authorities to assign them to that duty.

Dr. E. L. Gross, of the American Ambulance Corps in Paris, also has received numerous telegrams from the United States from aviators at home on leave. The great service the French army has done the United States in training Americans and giving them experience in air scouting and fighting is pointed out by Dr. Gross, who adds that a corps of men has thus been furnished capable of undertaking the training of a great army of the air.

As an encouragement to volunteer aviators a committee of a flying corps organization makes a standing offer of the following prize: $500 to every man winning the war cross, $1,000 to the recipient of the military medal, $1,500 to the man who receives the Cross of the Legion of Honor. An award of $250 extra will be made for each mention in dispatches.

London, Jan. 20.—England and France have been considering an aerial mail service between London and Paris, although there is no indication of its being adopted before the conclusion of peace. The practicability of the idea, however, has been demonstrated by the aerial service for official despatches which has long existed between London and the British front.

The distance between London and Paris, about 138 miles, has been covered in one hour and forty minutes by aeroplane. According to the present method, eight to ten hours is the best that can be expected even in peace time.

GERMANY

According to a report which comes from Zurich, the aerial experts of the German General Staff have advised against the construction of any more Zeppelins, upon the ground that they are too unwieldy, too vulnerable and too susceptible to the weather. Their recommendations will generally be recognized as sensible and its adoption may be assumed. It is believed that the use of the Zeppelins is chiefly attributable to the Emperor's orders or advocacy, and there is no doubt that they have sadly disappointed the high expectations which their introduction had aroused. The supposition was that they would prove incomparable instrumentalities of "frightfulness" and devastation. London and other British cities were to be destroyed by their agency, and there were some who imagined that they were to be employed with deadly effect against the British fleet.

All such calculations have completely miscarried. As a matter of fact, the Zeppelins have accomplished nothing of any military value. Not a ship or a fort has suffered from their activities, and the idea that they would create a panic in the United Kingdom and terrorize the British people into suing for peace has been proved entirely fallacious. They have had a precisely contrary effect. It has frequently been recorded that nothing served better to stimulate recruiting than a Zeppelin visitation. When one of the big balloons came along and killed a few men, women and children with the bombs it dropped, so much popular indignation was aroused by the shameful outrage which had been perpetrated that many a man who had put off enlisting hesitated no longer, and thousands of recruits were added to the ranks. Every bomb that was dropped materially helped to increase the strength of the British army.

GREAT BRITAIN

Capt. Henry J. Reilly, in a dispatch to the New York *Herald,* has the following to say about aerial work at the front:

"After an absence of more than a year from any European battle front the increase in the intensity of fighting methods which has taken place since the first year of the war is most striking.

"One of the days during a recent visit to the British front was a clear one, with the result that considerable aerial activity was possible. The first year of the war there would have been one or two captive observation balloons in sight. There were thirteen in the air at one time, extending over a long line, though the day was a calm one as far as fighting was concerned.

"Formerly two or possibly three or four aeroplanes at the most would have been in sight at one time and those widely scattered. Now whole squadrons of as many as thirteen or fourteen machines are not only seen in the air at one time, but each squadron is grouped like a flock of birds.

"It used to be that one or two guns would fire rather slowly at an aeroplane, with the consequence that there would be a line of not more than ten or twelve little white clouds in the air, marking the bursts of the shrapnel. Now many guns fire at the same time, with the result that the air around each group of planes is filled with a hundred or more white bursts from British guns or black ones from the Germans, depending upon which side is doing the firing. Sometimes both sides are firing.

"At the beginning of the war the guns designed for anti-aircraft work were of too small a calibre, with the result that they could not reach their marks. Consequently field guns had to be mounted on all sorts of improvised carriages in order to fire at the aircraft.

"Now there are many aircraft field guns on mortar mounts, primarily designed to fire at high altitudes and in any direction. An anti-aircraft gun used to be a curiosity. Now it is commonplace."

With the British Armies in France, Feb. 9.—One of the most thrilling flying episodes of the war was recorded to-day in the adventure of two young aviators who were leading an offensive patrol, when a shell riddled the machine. Three of the stay booms were cut, one blade of the propeller was blown away and all the controls, except the elevator for the planes, were put out of action. The machine was further smashed by the broken propeller blade and became uncontrollable.

The observer didn't hesitate, but climbed out three-quarters of the way on the right wing tip in order to balance the machine. The aircraft continued to fall in spirals, however, until it was about 2,000 feet above the earth.

Here the observer succeeded in balancing it and the machine glided down evenly. About 200 feet from the earth a slight movement by the man on the wing caused the machine to spin again, but the pilot was able to control it when just ten feet above the ground and the aircraft landed with neither man injured.

Italy

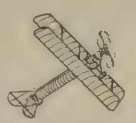
Rome, Feb. 13.—"Italian seaplanes yesterday made an effective air raid upon Pola (the Austrian naval base in the Adriatic), throwing bombs on the arsenal and on ships in the harbor," says an Admiralty announcement. "All the Italian machines returned undamaged."

Seaplanes also caused considerable damage in an air raid on the San Rocco navy yard near Trieste on Sunday night. The official statement says that a number of bombs were dropped, causing the outbreak of an extensive fire. All the machines returned safely.

"On the Carso a converging enemy fire against our positions at Point 144 was stopped by the effective and prompt work of our batteries.

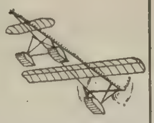
"Enemy aeroplanes bombarded Cervignano and some villages on the Isonzo. Three women and one child were killed."

Officials examining German Fokker biplanes brought down in Switzerland.



MODEL NEWS

Edited by G. A. Cavanagh



CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

The Loading, etc., of Models

From a *résumé* of the majority of duration machines constructed it was found that a loading of four ounces per square foot has given by far the best results. Indeed, models which were loaded under this margin have revealed a point which has manifested itself on several occasions latterly to the writer; it is that models loaded at 3 ounces per square foot have not given such good results as those loaded at 4 ounces. The former have without exception given much trouble in the adjustment of the centre of pressure, and requiring weather conditions as nearly as possible ideal.

A biplane is altogether a more interesting model to build, for it presents interesting constructional problems, which are lacking in the majority of monoplanes, while however simple may be its construction it certainly evades the term "flying stick." Quite apart from this, however, there is the increased amount of theoretical problems entailed, such as the correct position for the centre of thrust, thus requiring a deeper study of those laws which need to be only partly known to fly an A frame. Most of the members of this club have found that the centre of thrust placed slightly above the centre of greatest resistance has given best results with biplanes, while an overhang on the top plane effects good lateral stability. A camber of one-twelfth the chord has been found to be ample for models up to twelve ounces.

In many of the early tractors constructed by members, the rubber (*i.e.* the centre of thrust) was placed underneath the spar, but difficulty of adjusting the centre of pressure with the thrust low was experienced, so that it was ultimately placed above the motor rod. A much lower ratio of areas was employed than with canards, indeed I think this an essential for longitudinal stability. From experiments conducted by the members, the most effective position of the rudder was above the thrust line, much better stability and directional control being manifest than with its area equally disposed about the model's centre line of thrust. No angle of incidence was used, or found necessary, on the main surfaces of their tractor machines, the longitudinal vee for stabilizing purposes being maintained by a negative angle of 3° approx. on the tail. Better flying qualities have also resulted from models having a Morane wing plan.

(*Continued from page* 611)

Aero Science Club Notes

In order to promote interest in model flying and model construction among the new members of this club, it was decided at the meeting, held February 10th, 1917, that a contest, restricted to the new members, be held on April 1st, 1917. The contest will be for hand launched models for duration. All new members interested will kindly attend the coming meetings. The prize will be a silver cup.

Plans for the coming reception and dance are progressing and excellent talent has been secured. The reception and dance will be held Saturday evening, March 24th, 1917, at Terrace Garden. All persons interested will please address the Entertainment Committee, Aero Science Club, 29 West 39th street, New York City.

For the information of members we wish to state that Mr. Fred C. Thiele has resigned as an active member of the club.

Illinois Model Aero Club

W. E. Schweitzer

The semi-annual election of the Illinois Model Aero Club was held January 6th, 1917. Mr. A. Nealy was elected president; Mr. E. Cook, vice president; Mr. A. Wrixon, second vice president; Mr. W. Hill, treasurer; Mr. W. Sprague, Chairman of the Contest oCmmittee; Mr. W. Schweitzer, Chairman of the Membership Committee; Mr. J. Hall, Chairman of the Social Activities Committee; Messrs W. Schweitzer and W. Sprague were elected official publicity officials.

Another meeting was held January 17th. There were talks on power-driven models, given by Messrs. Hitt, Hittle and Hamlin. The machines exhibited at the Chicago Allied Bazaar were discussed and many interesting features talked about.

At our last meeting, that of February 2nd, Mr. E. Laird, our young aviator, gave a farewell talk. He spoke of the new machine he was building for next year's exhibition flying. He is soon going to Memphis, Tenn., to fly for the Government.

Mr. Ver Clair spoke of a cheap but strong fuselage fitting. Several plans for securing new members were discussed. A schedule of indoor meets will also be formed.

Paper Models

With a little patience and practice it is by no means difficult to build them entirely out of stiff paper and strips of wood so that they are not only good gliders but capable of being propelled by elastic motors. The only materials required are cartridge paper for the wings and body, thin cane and wood for the struts and chassis, umbrella rings for the tyres of wheels and cork for the wheels and other details. It will be found that the little thin canes of which Japanese screens are made are simply splendid for struts, etc. These models, if carefully made, are immensely strong and light; the wings can be made cambered and double surfaced, and do not require any spars or ribs, being made entirely of paper.

A very interesting type of paper model was made by a model enthusiast who having obtained good flights from hand-launched models with the main plane or planes in front, decided to make one fitted with a chassis and wheels and landing apparatus. He managed to make one which without any assistance would rise from the ground under its own power and fly with fairly good stability.

The machine is a tractor biplane.

The main planes consist of very thin framework of wood and note-paper, covered with tissue paper. They are single surfaced, and have a span of 9 ins. and 8½ ins. respectively and a gap of 1½ ins. and a chord of 1½ ins. The tail plane is in the shape of a semi-circle with a diameter of 3¾ ins., and is also covered with tissue paper. The motor consists of a thin paper tube with the elastic inside. The propeller is 3 ins. diameter and is driven by 10 strands of 1/32-in. square elastic, obtained from an elastic stocking.

The wheels are made of small discs of stiff note-paper ⅝-in. diameter, with a small bead through the centre, which is stuck in place by seccotine. This kind of wheel proved satisfactory in every way. The wheels are fixed on by means of small pins with the ends cut off, while a light wire frame forms the chassis.

Model aeroplanes made in this way have a very good appearance, besides being able to fly for short distances, and can be made to resemble their large prototype quite closely.

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested

Third Spasm of Our Aeronautical Dictionary

Aeroplane Characteristics	Skittish and Pesky.
Aeroplane: Mechanics of	Generally Students.
Climbing Rate	Depends upon the speed of the elevator.
Directional Stability	Sobriety.
Friction	Generally followed by disorganization.
Polar Co-ordinates	Capt. Amundsen and Admiral Peary.
Rolling Control	Studied by wrestlers.
Strut Formula	Better the clothes, more arrogant the walk.
Safety Factor	A strong pair of legs.
Washout	A railroad term.

Heard at the Aeronautical Exposition

Stout Lady: "Some people may like to go up in the air, but terra cotta for mine!"

Irate parent to young son: "No, Johnny, I will *not* buy you one of those flying boats!"

Stout party of about 400 lbs. weight: "Yes, in the advent of war, I will drive one of those 'Baby Scouts'."

Well informed young lady: "Well, if they are flying machines I *do not* see the object of those wheels underneath."

Same lady: "I should think that if they should put a lot of propellers on it instead of one or two, it would go much faster."

We reprint the following contribution to Aeronitis just as it was received, without altering it in any detail. It may not conform to the rules of subtle humor; in fact, may descend to the Chaplinesque at times. Our main idea in printing it is that maybe some reader will tell us what it is all about.

Dear Editor:—

Enclosed find a little bit of nonsense, which I hope proves interesting.

I was talking to one of them aviators last week. he was tellen me about a new engine on the market called Nipawarsusan says he its a great engin that he wanted me to come over and see it eye but it was wonderful says he see that fan Fan on the frount of it when it makes that go around 1400 times the engin gets as strong as 140 horses. I didn't know much about it but I thought it would be a good time to get a tip, (*the author is evidently a waiter—Ed.*) so I started to look it over and ask questions there was something fastened on it that went around the out side of the gas and mixed wind with it he called it the carbon something I cant remember the rest of it. Then there was another thing with a bunch of wiren (*wiring*) on it covered with small gum hose says he that what they call the magnetic that the thing that makes the gas goo off. Says he when I start the engine you take hold of the wire be sure to hold them tight and I did and the d—m thing hit me with litenin and doubeled me up in a knot susan began to root and the fan blowed me loose or I would have been there yet. when I went home I told the old Girl about it. I was still groggy from the litenin she got mad at me for being such a fool and give me a clout, (*the plot thickens!*) over the head with one of them Alumbago fryin pans the kind of stuff they are tryoin to make engines out off it wonderful that alumbago stuff it has great resistan qualities The pan never had a dent in it I think it is a remarkable stuff and woul'd be alright for an engin with a little bit of coaxin take a tip from me. (*The gentleman evidently is not A waiter—Ed.*)

They use it on automobiles to make a the unnecessary parts out of. This letter is from me.

Fred Bond
100 Mercer Street
Gloucester City, N. J.

Something You Never See in Advertisements

An Aeroplane Company

This aeroplane was just slapped together, and we must admit that we really never expected that it would amount to anything. The wing covering is of very poor quality, but our motto has been "Spare the expense, come what may." The materials and fittings are of the cheapest quality throughout, and, in fact, we doubt if the thing will last out a flight. The design is all wrong, and we have an awful nerve to ask money for it, but we need it to continue operation of the place we call our factory. Pax Vobiscum.

A Motor Company

This is the best model we ever turned out of our factory, and we confidently expect that it will run at least five minutes at one-tenth its rated h.p. before breaking down. The engine is a twin six, because everybody is building them, and although we know absolutely nothing about this type, we decided to take a chance. The engine fairly eats up fuel and only a millionaire could afford to run the thing. Taking it all and all we can think of no worse engine in existence. Price $4440. Cash price 150 dollars. No checks accepted.

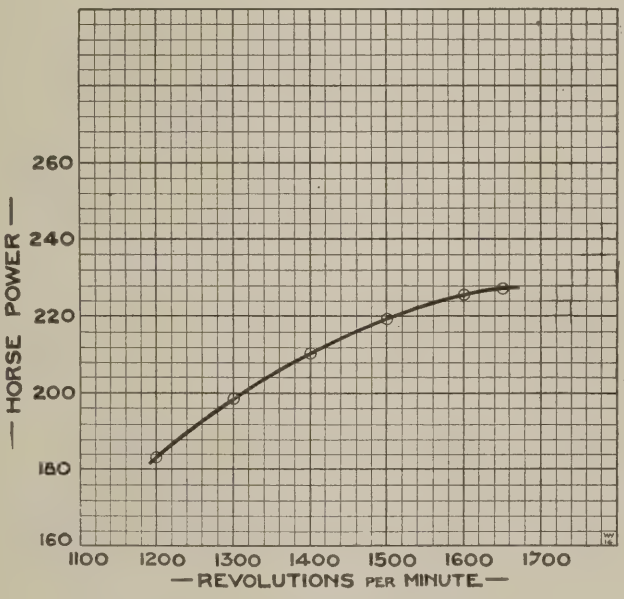
There is a new story about Mr. Kipling for which Mr. G. F. Monkshood is responsible, having brought it out in his new book. "The Less Familiar Kipling and Kiplingana." It appears that a friend asked Kipling whether he would not write on airmen as he had done on the commanders and crews of submarines. "Perhaps! some day," replied Mr. Kipling. "Oh, but you must!" insisted the friend; "let's see whether we can't hit on a good title." "Well," said Mr. Kipling, after a moment's reflection, "what do you say to 'Plane Tails from the Sky'?"

Courtesy N. Y. Eve. "Sun"

Curtiss

MODEL VX-3 motor was used by Victor Carlstrom on November 2nd in flying from Chicago to Erie, Penna., a distance of 452 miles, in 3 hours 57 minutes.

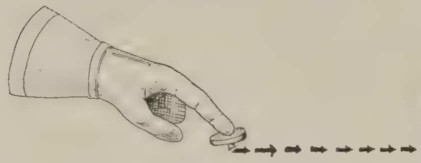
Owing to changes and improvements our 5″ x 7″ eight-cylinder motor, formerly known as Model "VX," rated at 160 horsepower, will hereafter be known as Model "VX-3" and will be rated at 200 horsepower. The following is a record of electric dynamometer test of stock motor "VX-3" No. 3512 as delivered from the Production Department:



Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
Total Oil Consumption (Lbs.)	6.50
Total Oil Consumption (U. S. Gals.)	.844
Oil Consumption (U. S. Gals. Per Hour)	**.844**
Oil Pressure Start of Test (Lbs.)	71.00
Oil Pressure End of Test (Lbs.)	72.00
Oil Pressure Maximum (Lbs.)	74.00
Oil Pressure Minimum (Lbs.)	68.00
Average Inlet Water Temp. (F.)	116.90
Average Outlet Water Temp. (F.)	140.50

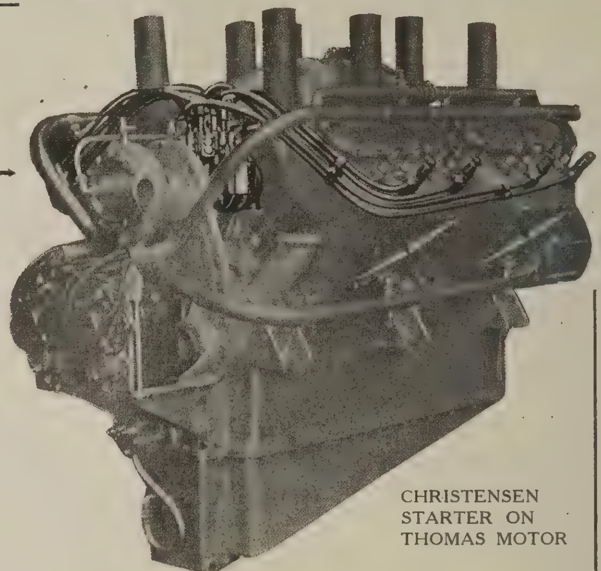
CURTISS AEROPLANE & MOTOR CORPORATION

BUFFALO, N. Y.



The Touch of a Button
AND
She Goes:—*Instantly!*

A Self Starter that combines unfailing action with simplicity and light weight; a Starter that cannot be put out of commission by excessive vibration; a Starter that is absolutely dependable, regardless of weather conditions or altitude.



CHRISTENSEN STARTER ON THOMAS MOTOR

Christensen Automatic Motor Starter

THE marked efficiency of the Christensen Self Starter is perhaps best suggested by the results of a test on a Hall-Scott Motor made at the plant of the Standard Aero Mfg. Co., at Plainfield, N. J. There on a tank of air of 250 pounds pressure, **28 complete starts** were made **without recharging the tank,** and the last start was made on the low pressure of 100 pounds.

Send for Catalogue

CHRISTENSEN ENGINEERING COMPANY, Milwaukee, Wis., U.S.A.

ESTABLISHED 1906

WITTEMANN-LEWIS AIRCRAFT COMPANY INC.
NEWARK NEW JERSEY

The Company's new plant is equipped with the most modern facilities for filling orders for aircraft of

Standard and Special Designs

Land and water flying at door of factory

SEE OUR EXHIBIT AT THE EXPOSITION

MAIN OFFICE AND FACTORY:
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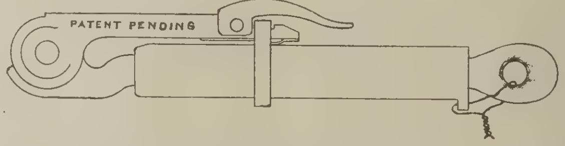
Telephone Market 9096

New York Office: 17 BATTERY PLACE
Telephone: Rector 2461

The Bellanca Turnbuckle
A Labor and Time Saving Invention

The purpose of this turnbuckle is to pull together and tighten or loosen, as may be desired, a metallic cord or cable. This is obtained by turning the sleeve in one direction or the other to suit the required purpose.



The advantage of this turnbuckle over all other types is that it can be attached and detached without changing the screw adjustment of the turnbuckle. It can easily be attached or detached, at the same time eliminating the necessity of readjustment.

The *Bellanca Turnbuckle* is manufactured to meet the recognized requirements of strength, weight and durability.

From the description above given, the advantages of the *Bellanca Turnbuckle* over all other types will readily be seen and appreciated.

Quotations and deliveries on request.

New York & Hagerstown Metal Stamping Co.
Manufacturers
Hagerstown, Maryland
New York Office, 50 Church Street, Suite 390

Cooper Training Tractor

(*Continued from page* 658)

is a single seater slow-speed Caudron type machine, convertible for land and water use. At the Aeronautic Exposition the machine was equipped with two main floats and twin tail floats, but Farman type wheels can be substituted for these in a short time.

General Dimensions

Span, upper plane	33′ 0″
Span, lower plane	22′ 0″
Chord at center	4′ 6″
Gap	4′ 4″
Speed range	35-45 m.p.h.
Weight, empty	500 lbs.
Weight, full load	800 lbs.
Motor, Frederickson	70 h.p.

The wings have flexible ribs which allow of a high angle of incidence in starting, and flattening out as speed is gained. The tail is also flexible. Ribs spaced 12″ apart.

Main pontoons each weigh 46 lbs. They are 9′ 0″ long, 22″ wide and 9″ deep. The skids rest upon the floats and continue back to support the tail plane.

Control wires are solid, except where they run over pulleys, in which case flexible cable is used. Pulleys ball bearing.

A five-cylinder 2-cycle rotary Frederickson engine is mounted on a steel plate at the forward end of the nacelle and braced inside the nacelle by cables attached to an extension of the shaft. Bore, 4½″; stroke, 3¾″; normal speed, 1,000 r.p.m. Weight, 180 lbs.

Witteman-Lewis Training Tractor

(*Continued from page* 658)

Length over all	27′ 0″
Motor, Hall-Scott	90 h.p.
Speed range	70-35 m.p.h.
Net weight	1,400 lbs.

In general appearance the Witteman tractor is conservative, consideration having been given to the requirements of a substantial training machine. Substantial construction is in evidence throughout, and the ease with which parts can be replaced is evident.

The landing chassis is bent to a flat V shape with wheels sprung on by means of a plate to which rubber wings are riveted, somewhat like the Wright practice. The wide track 62 inches, insures even landings.

The triangular tail surface has an area of 36 sq. ft.

The Dual Deperdussin control is installed.

The motor is a Hall-Scott 90 h.p., completely covered in, and cooling provided by the radiator at the nose of the machine. Fuel capacity is provided for a flight of three hours.

The Air Lure

(*From the Philadelphia Ledger*)

An aviator who in a fall of 800 feet broke both knees, both thumbs, his nose and one hip, while his associate received mortal injuries, expresses only an eagerness to get back to the air again and continue the study of the applied science of aviation. "Any one who has flown once always wants to fly again," he says. His instructor devised a theory to prevent the recurrence of such a mishap, promptly reproduced the conditions of the accident, and from a greater height permitted the machine to fall with him. The theory worked, and he regained control of the machine a few hundred feet from the ground. If it were not for such sangfroid and valiant persistence the knowledge of flying would not have progressed far since Langley on the Potomac or the Wrights at Kitty Hawk. The sons of Martha indeed have spilled their blood that future generations may read, as in clear print, the cryptogram of the air trail. Out of war's horror will come the more flexible and familiar employment of the aeroplane for commerce and intercourse. The wings whose shadow is now the shadow of death will give themselves again to a mission of the angels, and be commanded by the usages of peace. For he who has known the ethereal exhilaration can say:

"I alone have seen the earth,
Age-old fetters swept aside,"

and he will not be content outside of his dominion.

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Automatic
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Type IV, Films
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Scale Equalizing Printing Machine for Photographic Maps

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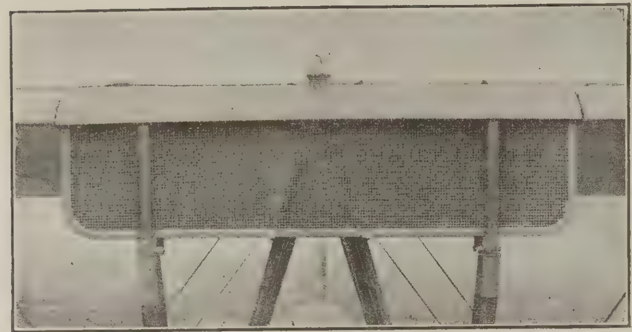


TYPICAL of the practical correctness of many innovations introduced by Sturtevant aeroplanes, is the small light radiator which fits neatly into the top wing. The circulation system is greatly improved, and the weight and resistance reduced by this simple and efficient solution of a difficult problem.

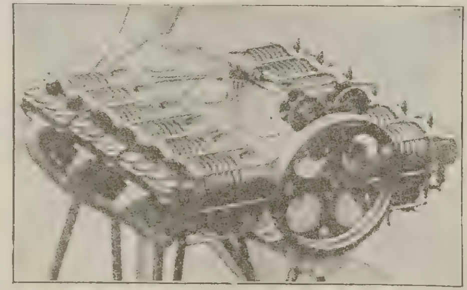
Sturtevant
REG. U. S. PAT. OFF.

AEROPLANE COMPANY
Jamaica Plain Boston

Dashboard Barometer

(No. 2081—Aluminum Case Aviation Barometer supplied United States Navy and United States Signal Corps, also Pocket Recording Barograph and Aluminum Case Barograph. These instruments for immediate delivery.)

A. HAUTSTETTER
308 Madison Ave. New York



¾ top view of ASHMUSEN 12-Cylinder 105 H.P. Self Cooled Aeronautic Motor

ASHMUSEN HIGH GRADE POWER PLANTS

ARE NOW READY FOR THE MARKET
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They actually develop over the rated Horse Power at 900 R.P.M. at propeller shaft—1800 R.P.M. at crank shaft, and are built for CONTINUOUS HEAVY DUTY.

Bore 3¾ in.—Stroke 4½ in.—Four stroke cycle.
Ignition—High Tension Magneto.
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Oiling—Forced Feed ASHMUSEN System.
Cooling System—NONE—Self Cooled.
Weight—70 H.P.—240 Lbs.; 105 H.P.—360 Lbs.
Fuel Consumption—70 H.P.—7½ Gals. per hour, Low Grade.
Fuel Consumption—105 H.P.—11½ Gals. per hour, Low Grade.
Oil Consumption—70 H.P.—¾ Gal. per hour, Good Grade.
Oil Consumption—105 H.P.—1¼ Gals. per hour, Good Grade.

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266 Pearl Street, Providence, R. I., U. S. A.

A Pilot's Necessity

THE accompanying illustration shows the compactness and completeness of the Cooper Aeronautical Tool Box. With the assortment of tools shown the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

After five years of flying experience these tools have been selected to meet every requirement for Aeroplane service. The size of the box is 28 x 9 x 10 inches.

Single Boxes, $100 — Discount on Quantity

The John D. Cooper Aeroplane Co.
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QUALITY
CRANKSHAFTS

FOR THE MOST
SEVERE SERVICE

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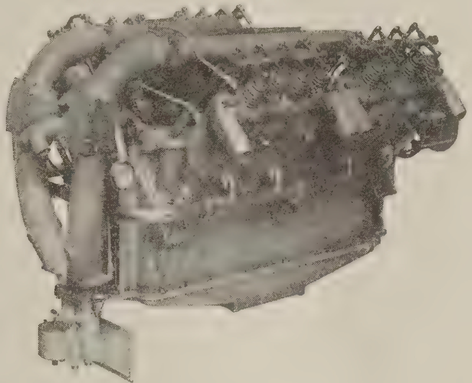
U. S. A.

Sturtevant
REG. U. S. PAT. OFF.
Aluminum
Aeronautical Motor



140 Horse-Power

An important change in Design and Construction of the Standard Eight-Cylinder Motor has effected:

Elimination of Cast Iron. Higher Efficiency.
Better Accessibility. Increased Reliability.
Weight Reduction of One Hundred and Thirty Pounds.

These features have been proven by Service Tests during the past eight months

Prompt Deliveries Assured

B. F. STURTEVANT COMPANY
Hyde Park : : : Boston, Mass.

A POPULAR PRICE
AIRPLANE
SPECIFICATIONS

TWO PLACE TRACTOR BIPLANE

Span: Top 32 ft., bottom 22 ft.
Length Overall: 23 ft. 9 in.
Chord: 4 ft. 6 in. Gap: 4 ft. 6 in.
Wing Curve: N. P. L. No. 6
Main Supporting Surface: 245 sq. ft.
Stabilizer: 18 sq. ft.
Elevators: 18 sq. ft.
Rudder: 8 sq. ft.
All auxiliary surfaces constructed of steel tubing.
Struts are 3 to 1 ratio and are hollow, linen-wrapped and varnished.
Fuselage Strut Fittings are so designed that the longitudinals are not pierced.
Entire Top of Fuselage is covered with a laminated turtle deck, linen-covered and highly varnished.
Motor is a six cylinder Radial Motor of 3½" bore and 5" stroke, turning a "Paragon" Propeller of 7 ft. 6 in. diameter, 5 ft. pitch, 1250 R.P.M.
Total Weight empty 600 lbs.
Price $3,000 f.o.b. Wheeling, W. Va.

KYLE SMITH AIRCRAFT CO.
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STANDARD
HYDROGEN
GAS BALLOON
CYLINDERS

Designed to contain 200 Cubic Feet of Hydrogen at 1800 lbs. per sq. inch

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OXYGEN, HYDROGEN, ETC.
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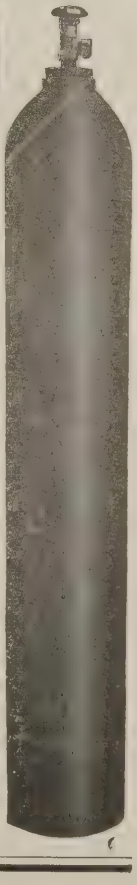

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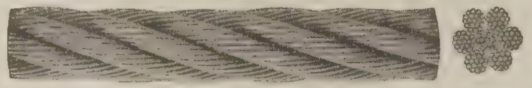

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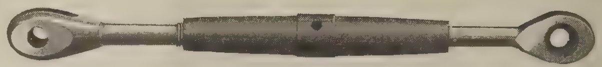

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SPECIALISTS
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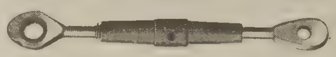
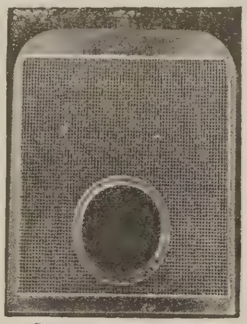


Rome Aeronautical
RADIATORS



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Our exceptional facilities enable us to make speedy deliveries

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Cross-Country planes and flying-boats have six years' actual building experience back of them.

Four Standard Models. Single and Twin motored three to seven passenger machines.

On application by interested parties, we will submit specifications on triple and four motored machines carrying as many as twenty passengers, and guarantee performance.

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TO BUILD YOUR MODELS, EARN IT BY SECURING SUBSCRIBERS TO
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WRITE FOR PARTICULARS

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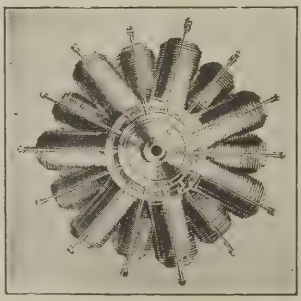

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One, two, three and four-cylinder compressed air motors for scale models.
Complete description with blue prints for two-cylinder opposed motor and tank . . .50c
Excellent skein rubber for model aeroplanes.
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Invaluable for military use because the officer can direct the pilot in scouting.
Indispensable when maps or photographs are to be made because both hands are left free.
Mouthpiece in position only during conversation.
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Outfit consists of 2 Head Caps, 2 Receivers for each user, light-weight Battery and Cords. Weight complete, 5 lbs. 5 ozs. Receivers Adjustable to any type of headgear.
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NEW MILITARY TRACTOR BIPLANE, IMported French motor 125 H.P. Speed 90 miles. Accessories and Hangar at Hempstead, Long Island. Box 451, N. Y. Athletic Club, New York City.

WANTED: DRAUGHTSMAN AND ENgineers. State qualifications, experience and salary required. Box 120, Aerial Age, 280 Madison Avenue, New York City.

INTERESTED IN AERONAUTICS? IF SO, why not join a progressive Club. Be associated with those who possess expert knowledge on the construction and flying of model aircraft and aviation in general. Write for information. Aero Science Club of America, Secretary, Engineers Building, 29 West 39th Street, New York City.

FOR SALE: NEW TRACTOR BIPLANE. Thirty-five horsepower Bates motor. Would sell motor separately. Blue prints furnished. Warren Kite, 785 South Street, Springfield, Mo.

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Aerial Navigation by Dr. A. F. Zahm	3.00
Aero Engines by G. A. Burls	3.00

The Aeronautic Library, 280 Madison Ave., New York City.

FOR SALE: BIPLANE TRACTOR, 80 H.P. Sturtevant motor, suitable for school or exhibition, with shipping crates complete. Price $2,000.00. We also have other machines suitable for all purposes. Address Champion Aeroplane Company, 1646 Ogden Avenue, Chicago, Ill.

FIRST CLASS FOREMAN FOR METAL DEpartment aeroplane factory. State experience, salary, etc. Replies held confidential. Box 121, Aerial Age, 280 Madison Avenue, New York City.

MODEL AEROPLANES AND THEIR Motors, by George A. Cavanagh.

One of the most comprehensive books dealing upon the subject of model aeroplanes and their motors. The book includes a short history, a complete description of a simple model, World's record Models, compressed air, steam and gasoline engines, models driven by such engines, world's records and a list of definitions of aeronautical words and terms. Price Net $1.00, Aerial Age, 280 Madison Avenue, New York City.

MODELS—MODEL AEROPLANES, ACCESsories and supplies. Material suitable for the construction of models that will FLY. Moderate prices. Prompt deliveries. Complete catalog free on request. Wading River Mfg. Co., 343 Sumpter St., Brooklyn, N. Y.

WANTED: A TRACTOR OR PUSHER TYPE land machine or a flying boat in good condition, with or without motor. Must be a bargain. Address H. Wagner, Hotel Warwick, Newport News. Va.

STAR JUNIOR TRACTOR PLANS, $5.00. Investigate our 20 H.P. Star motor and unique home study Engineering Course. Everything aeronautical. Chicago Aero Works, 326 River Street, Chicago, Illinois.

TECHNICAL AND PRACTICAL AEROplane engineer in position to design standard aeroplane and act as purchasing agent. Would like to hear from Pan-American Government representatives. Box 122, Aerial Age, 280 Madison Avenue, New York City.

I COMMAND LARGE CAPITAL TO BE INvested in a good flyer. If you have something that stands the test can make it profitable for you. Paul H. Kroeger, P. O. B. 1144, Los Angeles, California.

WILL SACRIFICE MONOPLANE. VERY fast. Good condition. Further details. The Gyro Motor Company, Washington, D. C.

FOR SALE: CURTISS TYPE AEROPLANE. Almost new. 85 H. P. Kirkham motor with shipping crates. Price $700. Otto Forthmiller, 2322 Marschall Avenue, Minneapolis, Minnesota.

NAVIGATOR, MERCHANT MARINE OFFIcer, desires to become aviator. Graduate, Caption School, Sweden. Financially unable to make payment at present, but will be pleased to communicate with Aviation School interested. Address Box 119, Aerial Age, 280 Madison Avenue, New York City.

AVIATION MOTOR, FOUR CYLINDER, seventy horsepower, in good condition, with propeller, can be seen at No. 112 West 42nd Street, New York City, Room No. 604. Bargain.

WANTED AT ONCE, COPIES OF EARLY issues of Flying Magazine. Address Box 117, Aerial Age, 280 Madison Avenue, New York City. Particularly Volume 1, Nos. 11 and 12, Vol. 2, Nos. 1 and 9, and Vol. 3, Nos. 6 and 7.

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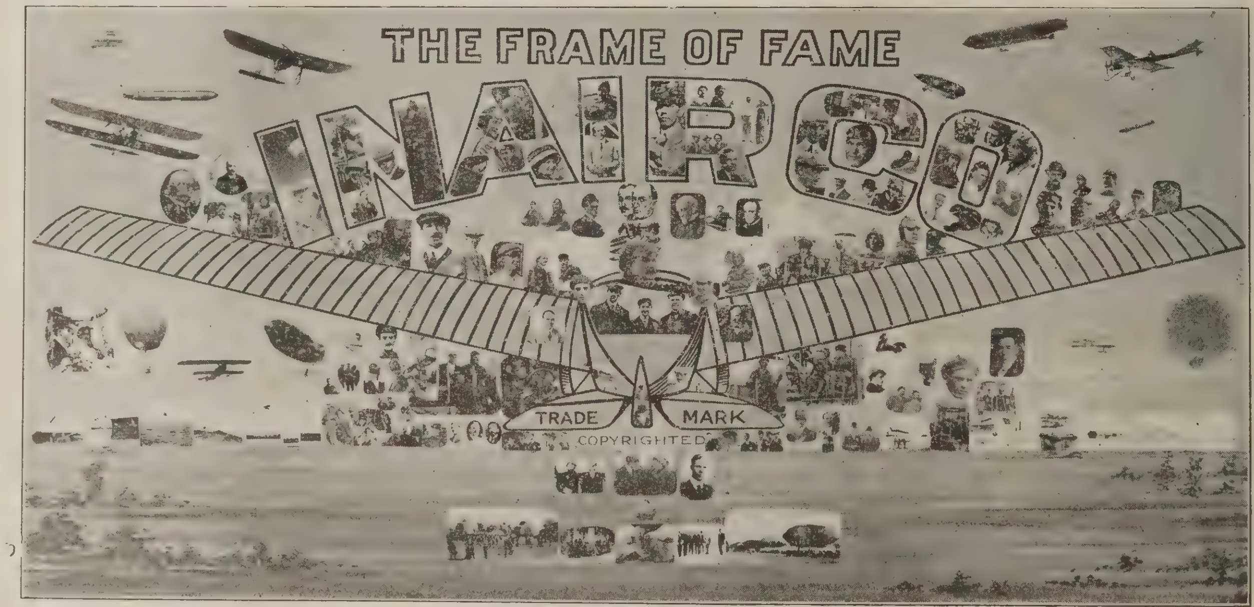

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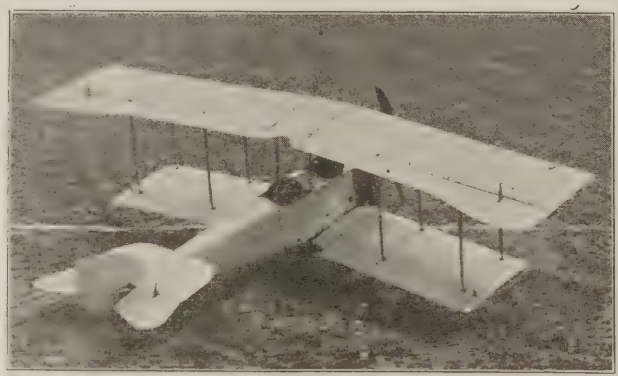

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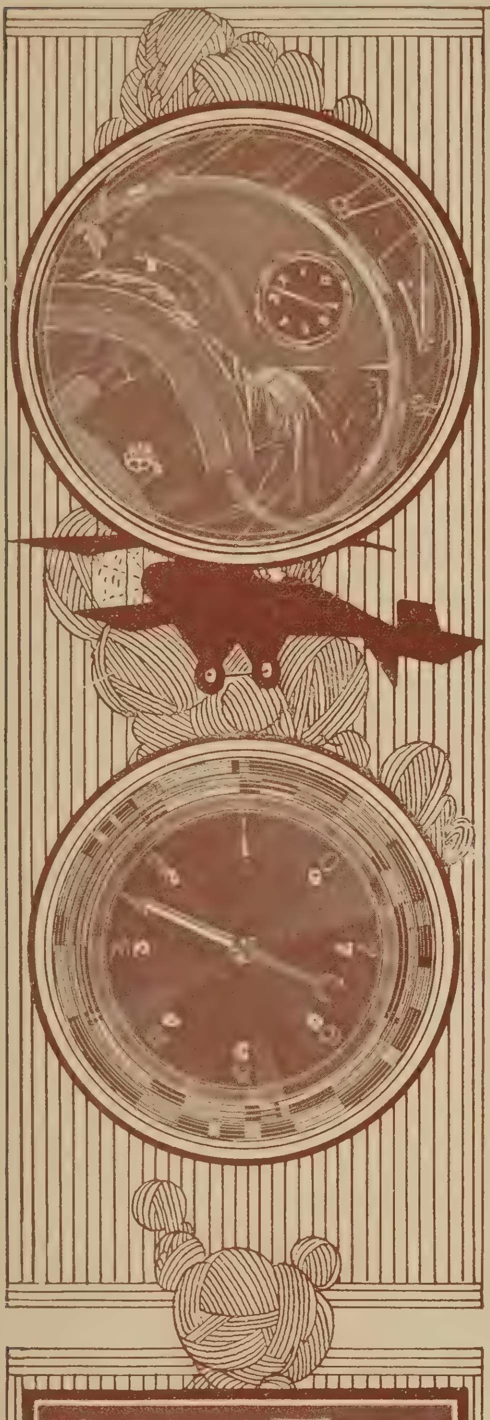

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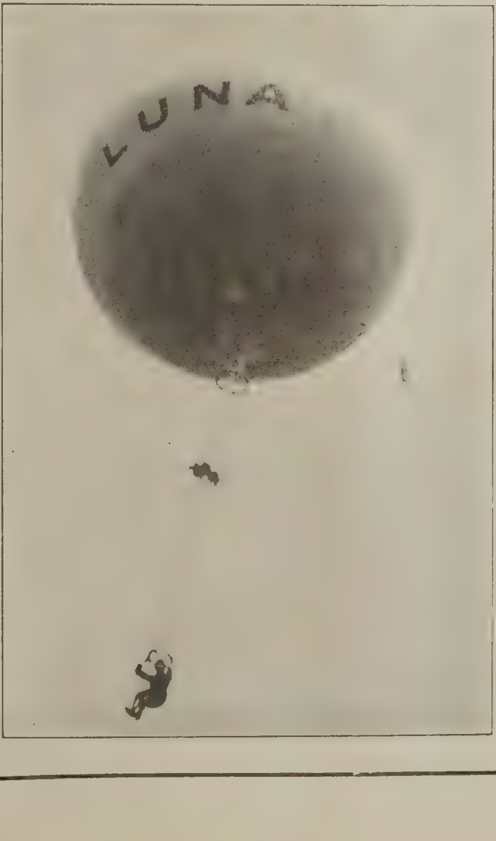

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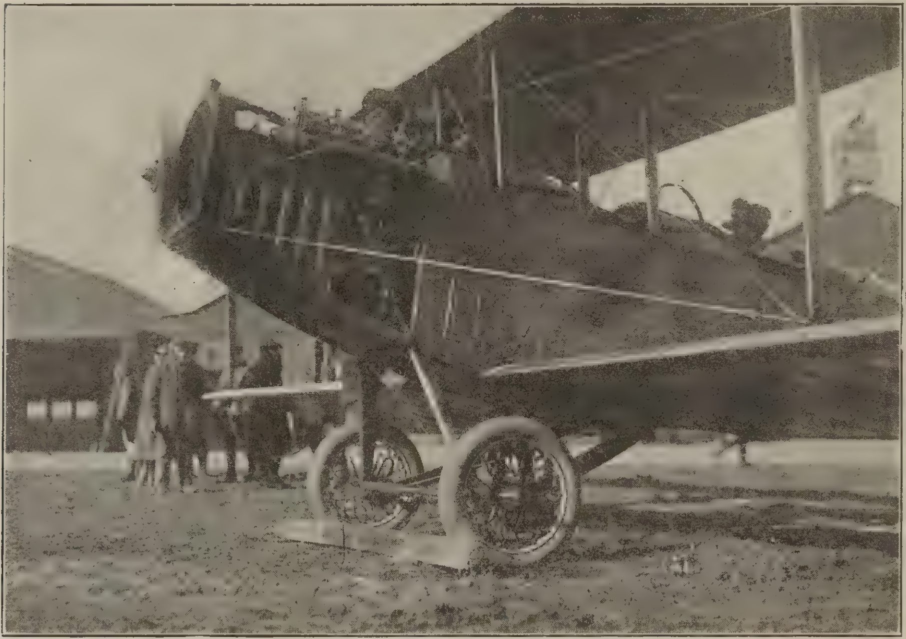

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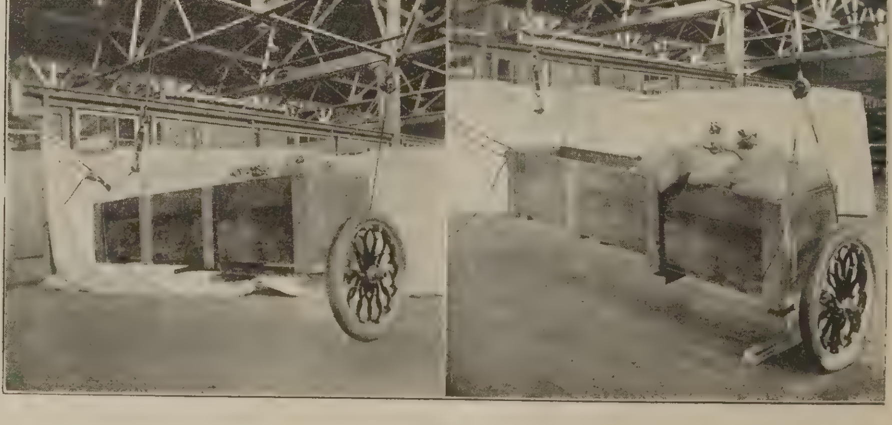

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VOL. IV NEW YORK, FEBRUARY 26, 1917 No. 24

LESS THAN ONE PERCENT OF NAVAL APPROPRIATIONS FOR AERONAUTICS—PRESIDENT HAWLEY OFFERS PROTEST

FINDING that less than one per cent of the Naval Appropriation has been allowed for aeronautics, Mr. Alan R. Hawley, President of the Aero Club of America, has sent the following telegram to Secretary Daniels of the Navy and Senator Benjamin R. Tillman, Chairman of the Senate Committee on Naval Affairs:

"The Naval Appropriation Bill under consideration entirely overlooks the importance of aeronautics. This bill allows only $5,300,000 for aeronautics out of an appropriation of $531,000,000, or less than one per cent of the total appropriation. It should be between ten and twenty per cent, which is the proportion allowed by other countries. Great Britain has been spending an average of $250,000,000 a year on her air service; there is being spent $80,000,000 for aeronautics in Canada alone. Great Britain, France and Germany have each over 10,000 aviators, one third of whom are in daily service. Each of these countries has between 100 and 150 aeronautic stations. The administration of the British air service alone occupies large buildings with not less than 340 offices; the Russian naval air service is in charge of seven rear admirals. The United States Army and Navy combined have less than 200 aviators, including the aviation officers who are in charge of administration work. We should have at least two thousand aviators and one thousand operators of military balloons. We should also have 20 aeronautic stations for the Army and at least one aeronautic station for each of the fifteen naval districts. The most economic solution of getting and training personnel is the establishing of universal training. But if there is a possibility that universal training will not be adopted at this session of Congress then provisions must be made for training two thousand civilian aviators and one thousand balloon operators as a reserve.

"A Committee of the Aero Club of America which investigated the possibilities of developing the naval air service are advised that the Navy has not the personnel needed to establish immediately even two additional aeronautic stations, but the problem can be solved by having civilian aeronautic stations established which will train the aviators under the direction of naval officers. Therefore, if the more economic universal training plan is not adopted provision should be made to establish civilian aeronautic stations under the direction of the Army and Navy and the appropriations for aeroplanes should be increased to allow three aeroplanes for each aviator. We again urge the adoption of universal training and increasing the appropriation for aeronautics."

THE WRIGHT PATENT IN CONGRESS

THE following discussion of the Wright Patent in Congress, is reprinted from the *Congressional Record,* so that it will be available to the entire aeronautic industry:

The Clerk read as follows:

Aviation: For aviation, to be expended under the direction of the Secretary of the Navy for procuring, producing, constructing, operating, preserving, storing, and handling aircraft, including rigid dirigibles, and appurtenances, maintenance of aircraft stations and experimental work in development of aviation for naval purposes, $5,133,000. *Provided,* That the sum to be paid out of this appropriation under the direction of the Secretary of the Navy for drafting, clerical, inspection, and messenger service for aircraft stations shall not exceed $75,000.

Mr. PADGETT. Mr. Chairman, I offer the following amendment as a new paragraph, which I send to the desk and ask to have read.

The Clerk read as follows:

Insert at the end of line 7, on page 5, the following as a new paragraph:

"To enable the Secretary of War and the Secretary of the Navy to secure by purchase, condemnation, donation, or otherwise such basic patent or patents as he may consider necessary to the manufacture and development of aircraft in the United States and its dependencies for governmental and civil purposes, under such regulations as the Secretary of War and the Secretary of the Navy may prescribe, $1,000,000; *Provided,* That such arrangements may be made in relation to the control of any basic patent connected with the manufacture and development of aircraft in the United States as in the judgment of the Secretary of War and the Secretary of the Navy will be of greatest advantage to the Government and the development of the industry."

Mr. MANN. Mr. Chairman, on that I reserve the point of order.

Mr. PADGETT. Mr. Chairman, pending the reservation, I wish to ask to have read the letter of the Secretary explaining the status with reference to the matter, which letter has just been received.

Mr. MANN. Then, will the gentleman ask to have the matter passed over?

Mr. PADGETT. Yes; I am perfectly willing to pass it over and return to it. On Saturday night I had a conversation with Dr. Walcott, chairman of the Aviation Board, and he discussed with me the urgency and the importance of this matter, and then this morning I had a conference with the Secretary of the Navy. The matter has been submitted to the President, and the Secretary of War and the Secretary of the Navy and the President all unite in requesting this legislation. The letter will explain. I ask that the letter be read.

Mr. MANN. May I ask the gentleman before the letter is read if the purpose of this amendment is to buy the basic patents for aeroplanes? As I understand it, the Wright Bros. control the basic patents?

Mr. PADGETT. Yes.

Mr. MANN. And the Wright Bros. and the Curtiss people are practically the only people who manufacture aeroplanes in the United States to-day?

Mr. PADGETT. Yes.

Mr. MANN. Is it the intention to have the Government own the whole thing after it is over—to buy out the basic patents?

Mr. PADGETT. Yes; to buy out the basic patents.

Mr. MANN. And then let aeroplanes be manufactured on payment of a royalty to the Government?

Mr. PADGETT. This does not provide that; that is, it does not provide as to what policy may be adopted, but the letter explains the status in which the Government is placed at the present time with reference to the development of aeroplanes.

The CHAIRMAN. Without objection, the time of the gentleman from Tennessee will be extended for five minutes, in which time the letter referred to will be read.

There was no objection.

The Clerk read as follows:

THE SECRETARY OF THE NAVY,
Washington, February 6, 1917.

MY DEAR MR. PADGETT: *A serious state of affairs exists in securing aircraft for the Army and Navy. The National Advisory Committee for Aeronautics, in a communication dated February 5 to the President, calls attention to the fact that various companies are threatening all other aeroplane and seaplane companies with suits for infringement of patents. This letter to the President goes up to say:*

"The result is a general demoralization of the entire trade. It is difficult to get orders filled, and in order to protect themselves in case they are forced to pay large license fees the companies have greatly increased the sale prices of their products. As the Army and Navy are the principal purchasers of aircraft in this country, they are paying a large increased cost, brought about by the uncertainty of the situation as regards aeronautic patents.

"The executive committee of the National Advisory Committee for Aeronautics has had the matter up under consideration, and finds that the situation is such that immediate action is necessary if the Government and the aircraft industry are to be protected and the art developed rapidly in order to meet the demands that will be made for aircraft in the immediate future.

"It appears that there are certain alleged 'basic' patents or possibly a single patent for aircraft that need to be considered in the executive situation, and it is the unanimous opinion of the executive committee that such basic patent or patents should be acquired by the Government, both for the development of national defense and also for civil purposes.

"In relation to the Wright patent (U. S. letters patent, No. 821393, *issued on May 22,* 1906, *to Orville and Wilbur Wright for flying machines, and recently purchased by the Wright-Martin Aircraft Corporation, of New York City) Mr. H. E. Coffin, of the Council of National Defense, writes, under date of January* 30, 1917:

"'I am thoroughly of the opinion that we should take such steps as will open up the Wright patent freely to all manufacturers. It may be wise to use this patent as a rallying point for the industry; but no financial penalty of consequence should be exacted from individual manufacturers. It is only through some such arrangement as will permit the free extension of the commercial possibilities of aircraft through civilian channels that we may hope to build up a proper volume of business over a period of years. In short, I believe that we can and must arrange for a purchase of this patent on the part of the Government at a reasonable figure before we can hope to develop the quantity manufacture of aircraft.'

"The Wright-Martin Aircraft Corporation referred to in December, 1916, *sent out a letter and copy of agreement and application for license under the Wright patent, which, in the judgment of many of the aircraft companies of the United States, were prohibitory from a business point of view, and also injurious to the development of aircraft and the aircraft industry in the United States.*

"It is the judgment of the executive committee of the National Advisory Committee for Aeronautics that provision should be made at the present session of Congress for the acquiring of such basic patent or patents in connection with the aircraft industry that the present unfavorable situation may be clarified, the Government protected from excessive charges for aircraft, and all aircraft manufacturers encouraged to go on and develop their business as rapidly as possible.

"At the present time the cost of aircraft appears to be excessive, partly because of the fear on the part of the constructors of patent royalties and expensive patent litigation, partly on account of the existing factory system (which with the development of business can be quickly corrected), and partly because the limited number of constructors, owing to the present uncertain condition of the industry, desire a large profit. These conditions at present operate to deter and prevent the investment of capital in an industry which is vital to national security and welfare.

"It appears that the available output of aeroplanes must be greatly increased to meet present demands and also that under existing conditions proper steps are not at present being taken to bring this capacity up to that which would be necessary in the event of sudden war."

In view of this statement and in order to meet the conditions presented, the Secretary of War and the Secretary of the Navy have recommended to the President the incorporation in the pending naval bill of the following:

"To enable the Secretary of War and the Secretary of the Navy to secure by purchase, condemnation, donation, or otherwise such basic patent or patents as he may consider necessary to the manufacture and development of aircraft in the United States and its dependencies, for governmental and civil purposes, under such regulations as the Secretary of War and the Secretary of the Navy may prescribe, $1,000,000: *Provided, That such arrangement may be made in relation to the control of any basic patent connected with the manufacture and development of aircraft in the United States as in the judgment of the Secretary of War and the Secretary of the Navy will be of the greatest advantage to the Government and to the development of the industry."*

The President has approved the recommendation of the Secretary of War and the Secretary of the Navy, and I am forwarding it to you with his approval in the earnest hope that it may be incorporated in the pending bill.

I am sending you also a statement containing extracts from letters received from manufacturers of aircraft, in response to an inquiry from the executive committee of the Advisory Committee for Aeronautics, of the effect upon the aircraft industry of the existing aircraft patent situation.

Sincerely yours,
JOSEPHUS DANIELS.

Mr. PADGETT. Mr. Chairman, I ask also to have read a memorandum giving information from the aviation board explaining the situation——

Mr. BUTLER. Mr. Chairman, these letters are very important. It is impossible for me to hear the Clerk read the letters. Now, can we have this material printed and put in our hands within a short period of time. This involves Government ownership of this great big industry not only now but hereafter, and I think we would want to know what we are doing.

Mr. PADGETT. Very likely before we reach that we will have it in print.

Mr. BUTLER. I understand, while the gentleman offers it here, there is a point of order pending; could not the gentleman agree that it go over?

Mr. PADGETT. I am going to ask that it be passed over and returned to later.

Mr. BUTLER. If the gentleman, however, will find some means by which we can get copies of this letter we will be very greatly indebted to him.

Mr. ROBERTS of Massachusetts. Will the gentleman yield for a moment?

Mr. PADGETT. Yes, sir.

Mr. ROBERTS of Massachusetts. Is there anything to indicate in the mind of the gentleman that we can acquire the basic patents of flying machines for anything like a million dollars?

Mr. PADGETT. I made the same inquiry, and my information was that we could.

Mr. ROBERTS of Massachusetts. Acquire the basic patents?

Mr. PADGETT. That is what I understand, but I am only giving the gentleman the information as it came to me. I made the same inquiry and I understand that it can be done.

Mr. STAFFORD. Will the gentleman yield.

Mr. PADGETT. Yes.

Mr. STAFFORD. Does the estimate include the price that will be required to pay for the improvements on the basic patents that are utilized in connection with aircraft?

Mr. PADGETT. I understand this would give us the basic ownership of the patents so we could operate, and it is a suggestion that has been worked out by the Aviation Board, submitted to the Secretary of War, the Secretary of the Navy, and the President. That is the way it comes to me. I will state to the gentleman, however, that I have not had an opportunity to go into it personally, because it came to me, and my first notice, as I stated, I think it was Saturday, was that Dr. Walcott, the chairman of the board, called my attention to the importance of securing the patents, and that he would have forwarded to me communications on the subject. I received the communication since the sitting of the House this morning, but I did go by and had a conversation with the Secretary of the Navy this morning, and he stated to me in substance what I am stating now.

Mr. STAFFORD. In that connection may I inquire whether the gentleman or his committee has considered the question of the Government under a war exigency appropriating and using all patentable devices and paying a reasonable price for the same?

Mr. PADGETT. I suppose the Government could commandeer it in time of war, but this is a provision to acquire ownership and prevent the exercise of that power, or remove the necessity of it.

Mr. STAFFORD. Then, the gentleman's committee has not considered any phase of the question of appropriating patentable devices for the use of the Government in case of emergency?

Mr. PADGETT. This information which I now desire the

Clerk to read I desire to be available to the Members, and I will ask the Clerk to read it.

The CHAIRMAN. The Clerk will read the matter indicated.

(The Clerk read extracts from letters received from manufacturers of aircraft in response to an inquiry from the executive committee of the Advisory Committee for Aeronautics of the effect upon the aircraft industry of the existing aircraft-patent situation.)

Mr. PADGETT. Mr. Chairman, I want to state to the committee——

Mr. BUTLER. Whose statement is it?

Mr. PADGETT. That statement was sent down to the Secretary. It came to him from the Aeronautic Board—the Aviation Committee. I wanted to state that I have instructed that the letter of the Secretary and this information go as a rush order to the Government Printing Office as a committee print, and as soon as it is printed I will have the copies furnished here in the House. Now, I wish to ask, Mr. Chairman, that this amendment which I have submitted go over, and that the committee return to its consideration later.

The CHAIRMAN. The gentleman from Tennessee [Mr. Padgett] asks unanimous consent that for the present this amendment, which has been read, go over and be returned to later in the consideration of the bill. Is there objection?

Mr. FARR. Reserving the right to object, will the gentleman permit me to embody in this matter information of great importance to the aeronautic field?

Mr. PADGETT. Read it, if you want to.

Mr. FARR. May I do so?

Mr. PADGETT. Yes.

Mr. FARR. These facts are taken from the Army and Navy news in the Washington Post of February 4 last. They are impressive in showing the great military use and benefit of air fleets and the tremendous importance to this country of immediate and expeditious action:

"The United States is woefully behind other nations in the number of trained men able to operate aeroplanes. Army officials estimate that the average man at the end of two years' service in the Army is worth one-half a soldier. An aviator able to fly after three months' instruction is worth 100 soldiers, they estimate. An expert aviator at the end of a year's training, according to Lord Kitchener, is worth an entire army corps, while Gen. Pershing declares that one aviator is the equivalent of an entire cavalry squadron.

"It was not until Villa's raid on Columbus that this country awoke to the fact that eight aeroplanes were all we had available to meet an emergency, and that the names of Langley, Wright, Curtiss, and others, all American pioneers in America, were like the prophet, 'not without honor save in their own country.' Congress then passed an appropriation of $17,000,000 for aeronautics for land and water defenses. Up to date close to $25,000,000 has been allowed.

"To-day the United States lacks, in round figures, about 2,000 aeroplanes, 25 dirigibles, and 150 observation balloons to make this country seventh in aeronautic equipment for aeronautic defense. We have only about 100 trained military aviators, and plans to train about 400 more. Yet the aviation section of the Signal Corps has received about 1,400 applications from candidates. There is no dearth of men competent to fly and willing to learn; only the machines and equipment are missing, and that now is being supplied as rapidly as possible.

"Germany at present has more than 9,000 aviators and about 2,000 machines in daily use in the war zone, and she is building machines to carry 15 tons, equipped with high-speed motors of 300 horsepower. England has 107 aviation and kite-balloon training schools, and is rapidly drawing near her plan to have 10,000 aeroplanes in service. In the Royal Flying Corps there are all told 100,000 men, including officers, aviators, gunners, mechanics, repair men, and others connected with the business of flying."

THE NEWS OF THE WEEK

Bay Shore to Have Large Aeronautic Station

Word has just been received from Lieut. Lee H. Harris, who was in charge of the Naval Militia Aeronautic Station last summer, that Bay Shore is to become quite an aviation base this coming summer.

Lieut. Harris and Ensign Ruttan are now at the U. S. Navy Aeronautic Station, Pensacola, Fla., where they were ordered December 1st. They have been taking an extensive course, both in learning to fly the large Navy seaplanes and also in the aeroplane erecting shops and motor shops.

Plans have been drawn up and bids received for erecting large aeroplane hangars, living quarters and mess hall.

The Navy Department intends loaning to the Militia a large tractor seaplane with which to instruct and use to make scouting flights out to sea. A fund is being raised to purchase another and larger seaplane capable of making a speed of 90 miles an hour, with a cruising radius of 400 miles.

These machines, together with the flying boat now on hand, will make the 1st Battalion, Naval Militia, N. Y., one of the best equipped aeronautic units in the country.

Lieut. Harris expects to recruit the Section up to its full strength of five officers and twenty-three enlisted men. Examinations are now being held so that the best material out of the countless applications for entrance will be accepted.

It is anticipated with the new equipment, to be able to turn out at least twenty aviators during the summer.

To Train Anti-Aircraft Gun Corps

Major Gen. Leonard Wood has approved an offer made by the officers of the Veteran Corps of Artillery of the State of New York to place the members of the organization under a special course of training for anti-aircraft gun service for the defense of the city in the event of war. This is the first move in this form of defensive preparedness attempted in this country. One company of the corps has already started training at the Seventy-first Regiment Armory, Thirty-third Street and Fourth Avenue. This is expected to be the nucleus for a large body of men thoroughly prepared and equipped for this work.

Aircraft Manufacturers' Association Completed

At a meeting of aircraft manufacturers held Thursday afternoon, February 15, 1917, the Aircraft Manufacturers' Association completed its organization. The organization will be made up entirely of manufacturers of complete aeroplanes and dirigibles.

The following officers were elected at the meeting held Thursday: President, Harry Bowers Mingle, president of Standard Aero Corporation; vice-president, Glen L. Martin, vice-president, Wright-Martin Aircraft Corporation; secretary-treasurer, Inglis M. Uppercu, president, Aeromarine Plane and Motor Company.

This is the organization which offered the support and co-operation of its members to President Wilson.

The aeroplane manufacturers who are the incorporators of the Association are as follows:

Aeromarine Plane and Motor Co.
John D. Cooper Aeroplane Co.
L. W. F. Engineering Co.
S. S. Pierce Aero Corporation.
Standard Aero Corporation.
Sturtevant Aeroplane Co.
Thomas-Morse Aircraft Corporation.
Witteman-Lewis Aircraft Co.
Wright-Martin Aircraft Corporation.

The following are the purposes for which the organization was formed:

(a) To provide an organization for the interchange of ideas concerning aeronautics of every kind and description, for the benefit of the members and the public at large.

(b) To instil and foster in its membership a spirit of patriotism and love for their country, and to provide an organization for the purpose of potently, ably and efficiently assisting the Government of the United States, or any branch thereof, when public welfare requires.

(c) To encourage the growth and understanding of all things aeronautical and any new and useful devices therein, or auxiliary thereto, and to effect a standardization thereof.

(d) For the purposes of fostering interest in things aeronautical, to arrange, manage, regulate, govern, control, give and have charge of all kinds of exhibitions, displays, expositions and shows.

(e) To acquire and dispose of by any and all lawful means, such property as the purposes of the corporation shall require for the benefit, but not for the pecuniary profit, of its members, subject always to such limitations as by law prescribed.

Naval Air News

A Benet-Mercier machine gun has been mounted on AH-10, the Burgess-Dunne pusher. This is the first Navy machine to be fitted with a gun. The trial in flight is anticipated with keen interest.

Construction has been started on the Navy School seaplane now being designed in the drafting office by Lieut. (j. g.) E. O. McDonnell, U. S. N.

Mr. P. D. Rader completed the Navy Department's prescribed tests of ten of the twenty-four Curtiss tractors on December the twelfth. The following day he left for Miami to become chief instructor of the flying school recently started by the Curtiss Company.

During the first week of December the North Carolina received one Burgess tractor and the Seattle three Curtiss tractors. The machines were assembled aboard in both cases.

New Hess-Bright Branches

The Hess-Bright Manufacturing Company announces the opening of two branch sales offices—one for the eastern portion of the country at 1974 Broadway, New York, and one for the central section at 1036 Guardian Building, Cleveland, Ohio. H. E. Brunner is in charge of the New York office and is assisted by H. A. Fonda. The Cleveland office is under the direction of R. E. Clingan, assisted by Walter Rippien and M. S. McNay.

The general sales manager, W. L. Batt, states that these offices are opened with the intention of giving more prompt and thorough attention to the ball bearing requirements of the trade, both as to engineering and sales, than has heretofore been possible.

Daych Joins Standard Staff

H. C. Daych, for three years executive secretary of the Advertising Club, has resigned, to take effect March 17. At that time he will join the Standard Aero Corporation as assistant to the president, Mr. H. B. Mingle. Mr. Mingle is also president of the Aircraft Manufacturers' Association, and head of a New York law firm. The Standard is now manufacturing Standard H3 tractor planes for the United States Government.

Dayton Now Has Two Aviation Fields

Dayton now has two aviation fields; the second one having just been acquired by the Dayton Engineering Laboratories Co. President E. A. Deeds and Vice-President C. F. Kettering lately purchased a 160-acre tract of level land lying within a mile of the center of the city.

This field, which is adjacent to Triangle Park, the recreation ground of Delco employes, consists of a long curving strip of land one and a half miles in length and ranging from 1,000 to 1,500 feet in width.

The work of clearing the tract will be started as soon as possible and hangars will be built, making a public landing place for aircraft.

In honor of the men whose genius and perseverance made airflight possible, this field will be known as Wright Field. During a recent visit to the grounds Mr. Orville Wright remarked, "This is admirably adapted for use in cross-country flights, as the long curved stretch admits of landing from any direction."

The proximity of Wright Field to the rivers leading from every direction into Dayton admits of visiting aviators following the general courses of these streams, which are the surest guides in air travel.

The field will also be charted on aviation maps, the identification marks will be listed and the charts furnished to all cross-country aviators, thus establishing Dayton as a regular stop-over point. This will establish in addition the importance of our city as the birthplace and patron of the aeroplane.

At the present time, co-operative plans are under way to mark landing places between Dayton and Detroit, and Dayton and Columbus. We have been assured that we will have frequent air visitors from Detroit this sumer.

The second field is a part of Moraine Farm, which is President Deeds' private estate south of the city. Announcement of this private field, the first in the country, was made but a few weeks ago, although flights have been made over it by Howard Rinehart during the past two months in the Wright-Martin warplane.

The Deeds Feld is primarily an open-air laboratory for aeroplane experimentation and general research. A machine shop and hangars have been constructed, and on this spot the various applications of electricity to aircraft will be developed in practically the same manner as they were worked out for the motor car.

Mr. Kettering and Chief Engineer W. A. Chryst have each been up over this field in the test plane, with the idea of studying the operation of our equipment under different atmospheric conditions.

Both the Wright Field and the Deeds Field are unique in their proximity to the heart of the city. The former is less than one mile north of the intersection of our two principal thoroughfares, and the latter is four miles and a fraction south.

Flying Corps of Daring Racing Drivers Plan If War Comes

War would put a damper on automobile racing for the coming season. There is a movement among racing drivers and their mechanicians to enter the flying corps of the United States Army if this country should be drawn into the war. Eddie Rickenbacher, who recently returned from a two months' stay in England, where he found that aviation had enlisted the services of many men formerly connected with motoring, is the sponsor of the plan. Rickenbacher said:

"If war is declared I will enlist at once for aviation work. I have already had some experience. I leave for the West, where I shall see many of the boys and at once put the matter up to them. I think many of them are looking at it just as I do. War would practically put a stop to racing, and we have a training that our country would need in time of war. We are experts in judging speed and in motor knowledge. This is also true of the mechanicians, and I am sure we would all quickly qualify for aviation work. I expect to get up a body of not less than fifty of us who will volunteer if war is declared."

Hall-Scott Engine in New Motor Car

The most unusual motor car ever made in the country is the Fageol, which was exhibited for the first time at the Chicago show. This $12,000 car is the product of California, being manufactured by Frank Fageol and L. H. Bill of Oakland. One of the chief points of interest in the new machine is the fact that it is the first motor car to be equipped with the famous Hall-Scott aeroplane motor.

The car has been designed for ultra luxurious service. Everything about the machine is unique. The sloping radiator, the ivory name plate which is electrically lighted, the ivory door handles, mahogany floor boards, new type of tire holders, all attract attention.

Earle Dunlap with Buffalo Aeroplane Co.

Mr. D. Earle Dunlap has resigned from the engineering staff of the Curtiss Aeroplane and Motor Corporation of which he was the second oldest member. He helped organize the Philadelphia Aero Club in 1912 and was its secretary until 1914; was secretary of the Curtiss Club of Buffalo, assistant engineer to the Coombs Aeroplane Co., headed his own propeller company and is now consulting engineer to the Buffalo Aeroplane Corporation.

Aviator's Wireless Feat

San Diego, Cal., Feb. 14.—E. J. Simon, a radio engineer of New York City, temporarily attached to the Army Aviation School here, with Captain Herbert A. Dargue as pilot, has sent a radio message from an aeroplane over a distance of 112 miles to the receiving station at the school. The current for the sending set was derived from a small generator driven by a two-blade wind propeller.

Mr. Simon is also working with Captain Clarence C. Culver in the development of radiotelegraphy as applied to airplanes. The two are also interested in radio-telephony, and experiments between aeroplanes in flight will soon be conducted here.

Students at the Atlantic Coast Aeronautical Station, Newport News, Va. From left to right: Sergt. Culver, Sergt. Schauffler, Sergt. Rolph, Sergt. Gallop, and Sergt. Barneby.

Aeronautic Division S. A. E. Discuss Metric System

A special meeting of the Aeronautic Division of the Society of Automobile Engineers was held February 19 in Washington, in the Chambers of the National Advisory Committee for Aeronautics, in conjunction with representatives of the various government bureaus, and aeroplane and aeromotor constructors, for the purpose of determining whether all measurements in aeronautic standards should be expressed in terms of the English or metric system.

Mr. Charles Manly presided. The Army was represented by Henry Souther and Capt. V. E. Clark; the Navy by Capt. J. C. Hunsaker and Lieut. Childs; the Bureau of Standards by Dr. S. W. Stratton; the Weather Bureau by Professor Marvin. The aeroplane companies, represented included Thomas-Morse Aircraft Co., Benoist Aeroplane Co.,International Aircraft Co., Standard Aero Corporation, Atwood Aeronautic Co., General Aeroplane Co., Sturtevant Aeroplane Co., B. F. Sturtevant Co., Erie Specialty Co., Aerial Age Co., and Flying Association.

The consensus of opinion of the meeting was that the metric system was desirable from the standpoint of ultimate efficiency, but there were important considerations why the present might not be the opportune time for a change. The Army favored changing to the metric system now; the Navy was averse to the change and wanted to retain the English system for the present.

The discussion was of real interest and we will print it in detail in our next issue.

Army and Navy News

Plans for the buildings and general layout of the plant at the new army aviation experimental and proving ground at Hampton, Va., and the preparation of schedules of the required machinery and other equipment are proceeding satisfactorily. Capt. John O. Steger, Quartermaster Corps, who has been assigned to duty as constructing quartermaster at the station, is co-operating in this work. The equipment can be purchased out of current appropriations, but authority of Congress yet has to be obtained to apply any of the money to the erection of permanent buildings.

Dr. Felix W. Pawlowski, assistant professor of mechanical engineering at the University of Michigan and in charge of the aeronautical course at that institution, has been employed by the Signal Corps as an aeronautical engineer, and he will be assigned to duty in connection with development of the establishment at Hampton.

The Weather Bureau is preparing to acquire information as to the conditions of the atmosphere as affecting aerial navigation, and one of its stations for this purpose will be established at the proving grounds at Hampton. The national advisory committee for aeronautics has recommended this. An estimate of appropriation of $100,000 has been submitted to Congress to be expended by the Weather Bureau for establishment and maintenance of not less than five of these special aerological stations to work in co-operation with other branches of the government in the observation, measurement and investigation of atmospheric phenomena in the aid of aviation.

The work of the aerological stations will be conducted by special meteorologists operating in close co-operation with those engaged in the actual operations of flying, and they will consist of detailed observations and measurements of the currents and structure of the air from the earth's surface up to 15,000 or 20,000 feet, and how these currents depend upon surface weather conditions, and how the currents are influenced by distinctive topographic and surface conditions both of land and water character.

A standard method of control for practically all military aeroplanes has been adopted and aviation officers of the Southern Department are being trained in its use under supervision of Maj. Benjamin B. Foulois, aviation officer of that department.

Col. William G. Haan, Coast Artillery Corps, who has been on duty at Fort Totten, N. Y., has been detailed to take the field officers' course in aviation at the signal corps aviation school at San Diego, Cal.

The army aviation section has adopted the metric system of measurement and all shop and other drawings of aeroplanes will indicate both the foot and metric scale, in order that they may be used easily by those accustomed to either system.

Detailed plans for the organization of the personnel of the aviation section of the Signal Officers' Reserve Corps are being worked out in the office of the officer in charge of army aviation.

Canadian Branch S. K. F.

The Canadian S. K. F. Co., Limited, has been organized under Dominion charter for the manufacture and sale of S. K. F. Self-Aligning Ball Bearings in Canada. All correspondence should be directed to Toronto, in which city headquarters have been established at 47 King Street, West.

Breaking In Army Aero Recruits

There has been unusual activity at the Hempstead Plains aviation field during the last few days, and preparations have been progressing rapidly to break in twenty-seven young aviators who have enlisted in the United States Aviation Corps.

Their instruction has begun and will be continued every day until they thoroughly understand it. This week fifty machines are expected at the camp, and this number will be increased until there are seventy-five aeroplanes of various types on the field. Special quarters have been built for the men so that they may be comfortable.

Among the equipment on the field will be six pursuit planes, two triplanes, two biplanes and two monoplanes.

The machines are also to be equipped with stabilizers and contain a small gun, which can be operated by the pilot. A feature of the new machines received is the unobstructed view which the pilot will have. The new machines that have arrived are equipped with cameras, which are operated with a trigger, and can be used for photographing the country over which the aviator is passing.

Captain Joseph C. Carberry is in charge of the field, and will have the men instructed according to the French method. This is by having them fly in one direction and behind each other for one day, then to follow the same process in the opposite direction the following day.

As soon as the weather permits the million and a half candle power searchlight will be used and night flying tried.

The men are very enthusiastic over their work and are getting into the groove with remarkable quickness.

Aero Club of New England Offers Co-operation

The Aero Club of New England, acting with characteristic patriotism, telegraphed President Wilson recently as follows: "The Directors of the Aero Club of New England pledge you the loyal and zealous support of the Club and its members in protecting the honor and rights of this country against all comers and at all hazard."

AERONAUTIC MAPS

By E. Lester Jones, Superintendent of the U. S. Coast and Geodetic Survey

THIS is a subject which is so new that it is difficult to make any definite statements upon it. It is also a subject which calls for earnest thought, not only by the map-making organizations of the national government, including of course those bureaus of the War and Navy Departments which show by maps the military information desirable to know and have accurately co-ordinated in position, but also by this organization and by the individual aviator.

When one is in the air he necessarily wants to come down to earth. He wants to know where to land and how to get to the landing place.

If the area over which an aviator should operate in time of peace or war is limited in extent, he may by careful study know the ground under him in a short time. He hardly needs a map of special design to guide him any more than you would need a map of your garden or of the public park near which your house is located.

But when large areas are to be covered, the problem is a different one. Here we need a highway to guide one between points widely separated. How can this be done?

We may assume that there is a railroad which connects each two contiguous places of importance, such as Philadelphia and Baltimore, or Washington and Richmond, or that there may be a water route between them, such as the Mississippi River between St. Louis and Memphis, or the Chesapeake Bay between Annapolis and Norfolk.

To go from one of those cities to the other of the pair it is only necessary to follow the road or water course. A map could be prepared, on the proper scale, for each section of the country, showing the guiding features. Towns and villages along the routes could be shown in outline only, the individual streets and buildings being of no importance for purposes of identification except in special cases. It is the outline of the settlement which is necessary for its identification. The area of the settlement might well be shown in color.

We might speculate on the question of how to indicate landing places on the map in such a way that they might be easily identified, but here the aviator must come to the assistance of the map maker, for after all it is the man in the air who is using the map and the maker of the map must defer largely to his experience and judgment.

If there is uncertainty as to what should be the character of the special maps for aviators, there is none regarding the maps needed badly over most of our area for general military purposes. For instance, there is no topographic map of any part of our Atlantic coast south of Norfolk, Va., and of many parts of the coast to the north of that place. Nor is there a single place along the Gulf coast where we have any topographic maps. I am excepting the narrow strip of coast topography, seldom wider than three miles, mapped according to the modern methods of the Coast and Geodetic Survey. This topography has until recent years been shown on the Coast charts, but inability to even keep the hydrographic data up to date has made it necessary to leave this topography off the latest editions of sailing charts. Lack of funds for field work has also made it impracticable to keep this narrow strip of topography revised as changes have occurred. We therefore may say that our coast topography is in very poor condition for military uses.

There is a movement now in military circles to start a systematic mapping of a strip of topography approximately twenty miles wide back from the coast lines.

This seems to be the minimum amount which under modern conditions of warfare will be needed for the defense of the coasts and the movement of troops along them. This width should not of course be definitely set at twenty miles. At places ten might be ample, while at others forty or fifty miles inland might be advisable.

What has been said about the needs of our Atlantic and Gulf coasts applies equally to the Pacific coast and to the land boundaries of our country.

While this border strip of topography is needed for defensive and offensive purposes, it is desirable and I might say essential for the commercial and industrial development of the country, and for all three purposes we need to have the vast areas of our interior properly mapped. There is scarcely a line of human endeavor that is not dependent for its efficient operation upon some kind of a map.

The life insurance companies must have maps on which are shown the densities of population. Maps of various grades of excellence are needed in the extension of railroads and electric roads, in the planning of drainage and irrigation projects, the extension of our country road system, the development of our water-power, the efficient administration of our forests and in numerous other lines.

If we are to maintain a military establishment adequate to the defense of this country, we must also develop our resources in order that we may bear the expense without undue strain upon the income of the nation. We must make use of our natural resources, without wasting them, and this can best be done by having our area properly mapped. The cost of this mapping would be less than that of half a dozen dreadnoughts which become obsolete in a few years. The maps of all but a small portion of the country would last forever and would need only supplementary work as our development progresses.

It must be evident to everyone that the aviator who travels through the air, like the navigator who travels upon the sea, needs maps to guide him in going from place to place over the country.

Aside from showing natural and structural features in their true relation to each other, there will be certain other information needed to be shown which all aviators will require whatever may be the purpose of the air voyage.

In addition to the information needed for all aviator maps there will be special features shown on the maps designed for whatever special service the aviator may be engaged in. What these special features and information may be will be determined by the needs of the special service.

The basis of the aeronautic map should be an accurate topographic map of convenient size and scale.

The knowledge of safe landing places for aircraft is more essential than for seacraft, as for instance the seacraft may anchor when having engine trouble but the aircraft must come to land in such an event and his map must show the safe landing places.

The congress of the International Aeronautical Federation, at Vienna, June, 1913, discussed the question of aeronautical charts, outlining as a basis of further discussion some of the details of the construction of such charts, their size, scale, etc., pointing out also at the outset that such charts should be of international character. Owing to the long flights that were even at that time being made and the proximity and size of the countries represented at that congress it was quite natural that the necessity for international maps was impressed upon the minds of the members. In the western hemisphere the necessity for international maps is not so apparent, though the geodetic control for all maps should be international in character so that the maps at the boundaries of the large countries of the western hemisphere can be co-ordinated, for whatever purpose they may be required.

In any article on aeronautics which discusses the needs of the aviator, the item of charts is among the first things mentioned; and the general complaint noted is that there are as yet in this country no such charts, which could be used by the aeronaut for traveling over even what are now considered moderate distances for flying machines. In fact there are considerable areas where no systematic topographic mapping has yet been done and consequently there are no collected data in these regions from which aeronautic charts could be constructed. One of the present needs for "expediting the map," as urged by Prof. Davis of Harvard, is that such information is now becoming indispensable also for the aeronaut. No less than mapping the entire land areas of the country will suffice to meet the actual needs of the aviator, not to mention many other interests also requiring similar information.

Mapping such large areas demands a fundamental geodetic control which requires the fixing of many points by means of triangulation and astronomic methods which the Coast and Geodetic Survey has been engaged in and is prepared to supply for mapping purposes; the amount of such control being limited only by the amount of funds at its disposal for such purposes, as it already has the organization, methods, and experience for such work.

The making of the aeronautical map will require much careful and painstaking study, involving a consideration of the character of information the aviator needs, and how this should be represented on his charts. In addition to the information that can be shown on the maps, a guide or "Coast Pilot" in pamphlet form, giving information about landing places, supplies, etc., for air machines, would be very useful to the aviator.

A word about our sailing charts will be appropriate here. While surveying of our waters close to the coasts has been carried on for one hundred years, there yet remains much to be done. We know the dangers to be avoided and the channels which may be safely navigated only in a general way.

Along our New England, New York and Florida coasts there are isolated dangers in the form of pinnacle rocks which endanger the safety of our deep draft commercial and naval vessels. The old methods of hydrographic surveying with the lead and plumb-line could not detect the presence of these rocks. We are fortunate in having a new device called the wire drag by which they can be found. The dangerous waters should now be swept with the wire drag, and this should be done as rapidly as funds can be provided for the work.

This wire-drag work is imperative to the safety of submarines which must navigate at a depth of at least one hundred feet. Our largest surface vessels draw less than forty feet.

There are many large areas in the Pacific off our western coast where there are no soundings. These areas should be surveyed in the very near future.

The waters of Alaska also need to be surveyed. While much has been done there much remains to be done. Accurate charts there will greatly expedite the development of that rich territory and thus add to our wealth and strength.

Let me conclude by saying there is the most urgent need for accurate topographic maps along nearly all of our coasts, and of the greater portion of our interior area. We should have our waters accurately charted and all dangers to navigation shown. Let us work to have these made as rapidly as the mapping organizations can work efficiently and let the data collected be used in proposing special maps to meet the needs of the aviator.

I venture to predict that the day is not far off when the United States Coast and Geodetic Survey will be engaged in surveying from ships in the air for the benefit and advancement of aeronautics.

AEROMARINE 8-CYLINDER 100 H. P. MOTOR

THE Aeromarine Plane and Motor Company exhibited at the Pan-American Aeronautic Exposition one of their eight-cylinder 100 h.p. aviation motors, which attracted considerable attention. The general description, as supplied by the manufacturers, is as follows:

These motors are four-cycle, eight-cylinder V-type geared down, with 3½" bore by 5⅛" stroke, high speed.

All reciprocating parts are light and finely balanced while the revolving parts are made very accurately of the highest grades of steel as are also the studs, nuts and bolts. The crank case and its various parts are made from aluminum alloy.

Oiling System—The lower crank case, made from cast aluminum composition, contains the oil with sufficient oil for a five-hour run at full power. Increased capacity can be provided when required.

The oil pump is located on the lower part of the crank case and is driven by ground spiral gear. Large passageways are provided to take the oil from the lowest part of sump which is located at centre, and force it through the crank shaft, cam shaft and gears. A pressure gauge is located at the instrument board, where it can be observed at all times.

By means of a pressure relief valve, a constant pressure of 30 lbs. is maintained on the oil within the crank shaft, the surplus oil pumped going to the timing and propeller driving gears—the latter being oiled by means of the oil holes drilled through to centre of shaft. No "splash" is employed and no oil is allowed to remain in upper crank case but is carried off to reservoir.

Only one screen is employed, one of large area and good sized plug at bottom for dropping used oil.

Oil indicator is located at top of motor showing level by means of a small red ball on a white background and actuated by metal float at bottom of sump.

Cylinders—The cylinders are in two blocks of four, made from special cylinder aluminum casting with hard cast iron liners. The detachable heads, at present, are of cast iron but the company is now perfecting an aluminum head which it hopes soon to use exclusively on these motors.

Pistons—The pistons are also of a special aluminum alloy which goes far toward making a successful high speed motor. The pistons have two rings at the upper and one ring at the lower end. No set screws are used for locking wrist pin, such means tending to distorting piston.

A very light wrist pin of large diameter is used, with hole in centre tapered both ends, leaving thickest metal in centre where greatest bending moment occurs. The wrist pin is allowed to move both in connecting rod and piston and is simply held at ends from passing beyond boss in piston.

Connecting Rods—The connecting rods are of I-beam section, forked and bushed to run on crank shaft with a brass bearing closely lined with white metal. These rods are machined to a nicety all over and are truly an example of advanced motor construction.

Crank Shaft—The crank shaft is short between end bearings and runs on three babbitt lined bronze bearings.

Cam Shaft—The cam shaft is forged with cams integral, case hardened and supported by five bronze bearings. The cams are so arranged that each one actuates two valves through a rocker arm. This construction allows smaller valve parts without crowding and at the same time, provides an ideal means for transmitting motion from the cams to the valves.

Delco ignition and starter are provided and are built in as an essential part of the motor.

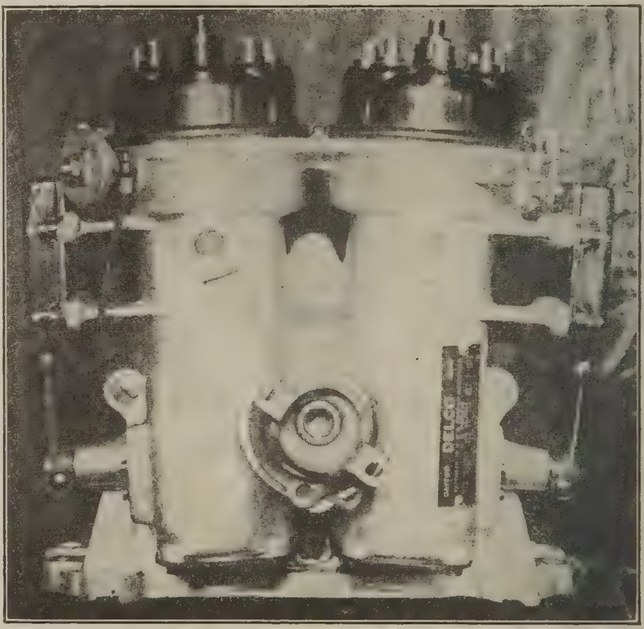
Two sparks per cylinder are used, the spark plugs being located at opposite sides of the cylinder head, which together with the valve in head arrangement, make a very powerful combustion chamber.

Carburetor—The carburetor is the Zenith twin-barrel type supplying gas through a water jacketed manifold.

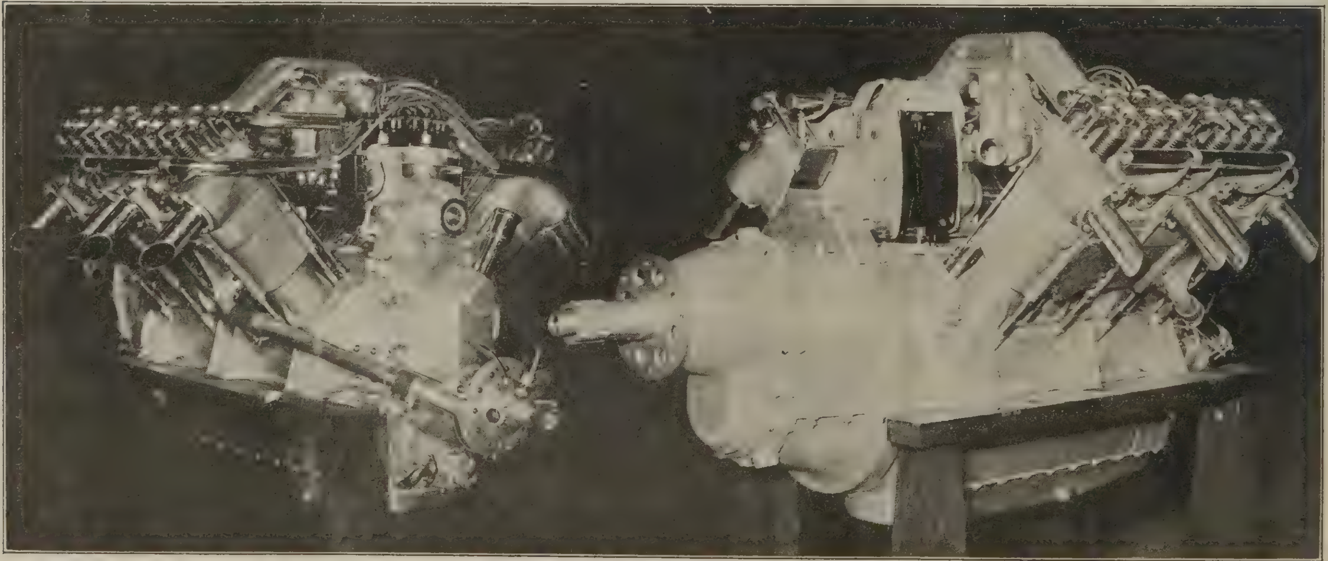
Power—100 h.p.

Gear ratio: standard 7 to 4; optional, 2 to 1.

Weight: 450 lbs. with electric generator and starter.



Twin distributor on Aeromarine eight



The Aeromarine 8-cylinder aviation motor.

FOREIGN NEWS

FRANCE

Georges Carpentier, heavyweight champion of Europe, has been, according to "Trench Wireless," killed in action. "Trench Wireless" means the mouth to mouth conversation of the soldiers at the battle front, which conversation gradually reaches the large cities, while actual confirmation of the reports are withheld by the censors.

The report in question states that Carpentier was killed by the bursting of a shrapnel shell about four weeks ago. He was last heard of as a member of the Flying Corps.

Ruth Law, the daring aviatrice, holder of the American record for distance and the world's record for distance flown by a woman, is now in France, and from her correspondence to the New York *World* it seems that she has had interesting experiences, and a good opportunity to judge foreign machines and pilots at first hand. To quote from her correspondence:

"The most impressive feature of aviation in France is the great number and variety of aeroplanes at any one flying field. I saw fully a hundred hangars in one field, each hangar capable of housing a score of machines, and all seemed to be full.

"France is ten years in advance of other countries as a result of the necessities of the war. What a wonderful thing it will be, when peace is restored and all these aeroplanes, now carrying big guns, will fly on peaceful missions carrying passengers and mail and other useful burdens.

"Le Bourget, seven miles northeast of Paris, is one of the centres of aviation in France, and in this huge aircraft city may be seen every type of flying craft that is being used at the front. After presenting a military pass and going through numerous formalities, I was escorted by a young French Captain to inspect all the different models, and he explained their particular usefulness to me.

"One little monoplane was flown for my benefit, it being the newest arrival and the tiniest machine that ever took the air. It looked exactly like a humming bird, but instead of a long bill it has a machine gun which shoots through the propeller. The machine is so pretty it is difficult to realize that it is an engine of destruction, and sure death for the pilot of any enemy machine that it overtakes.

"Aviators are still quite a curiosity in America, and I stared wonderingly at the groups of fine looking boys, all trained pilots, who stood awaiting orders to go up. There seemed to be no end to them. To these boys flying is a pleasure, as could be seen easily from the antics through which they put their machines. Looping loops, diving, tail spins from great heights, rolling over and over in the air and steep banking were among the stunts they performed for a small but admiring group of spectators.

Miss Law then goes on to tell of a trip in a speedy monoplane with M. Morane, the famous French designer and constructor, and after speaking of the wonderful speed and great climbing abilities of the machines she continues:

"At an altitude of 3,000 feet we flew close by a big dirigible; it was the first airship, heavier than air, I had ever seen. The aeroplane constructor, who is one of the cleverest and most expert pilots I ever saw, guided our craft so close to the big airship that I could see the men of the crew in the gondola-like car swung below the huge, translucent gas bag.

"I had by this time become accustomed to the tremendous speed, and as we flew toward the city the spectacle was the most inspiring I ever saw. Along the white, winding roads I could see snakelike caravans of army automobiles going and coming to and from the front carrying supplies. I saw the Eiffel Tower jutting into the sky and the Sacre Coeur Church on the summit of Montmartre, and the huge arch of Triumph.

"On the way back to the flying field M. Morane said he would put the machine through its paces and show me just what he could do with it. First we stood up on one wing, then, with the ease and grace of a bird, we dived and spiralled and then climbed again. Then in beautiful, great circles we came floating down past rows and rows of military hangars, coming to a stop in front of our waiting automobile.

"The most interesting flight I had ever undertaken had come to an end all too soon.

"My hat is off to the French—their aerodromes, aeroplanes and aviators are wonderful."

Throughout France preparations are being made on a gigantic scale for an early spring offensive on the Western front, acording to a number of French passengers on the French liner Chicago, from Bordeaux.

Lieutenant Frederick Zinn, of Battle Creek, Mich., who returned on a furlough after figthing for more than two years, first in the Foreign Legion, and then as a member of the famous M124 aviation escadrille, tells of the remarkable co-ordination existing between the infantry and the aeroplanes in an offensive action.

"The moment the colonel gives his regiment the order to charge the attack is directed by signals from aeroplanes," said Lieutenant Zinn. "A new system of signalling is employed, whereby constant communication may be maintained with the advancing forces.

"In many instances the infantry may be warned of concealed dangers which lie directly in the path of the charging lines. In other words, the work of the general or colonel directing the charge is transferred to the 'sky' lieutenant, and the success or failure of an attack rests in a large measure on him.

"The aeroplanes directing an attack fly at an altitude varying from 1,000 to 1,500 feet, and naturally bear the brunt of the enemy's fire. Many an aviator has lost his life, because in the interest of the troops being led by him, he has taken an unwarrantable chance to warn them of a particular peril, and in so doing was 'winged.' However, the system of having aeroplanes direct an attack has been found most advantageous for the infantry, as their losses have been appreciably lessened."

At the outbreak of the war Lieutenant Zinn volunteered his services to France and joined the Foreign Legion. After serving a little more than a year and a half he received a "pleasant" wound. When asked to explain what a "pleasant" wound was, he replied that it was soldier slang for any wound not in the face. Lieutenant Zinn was wounded in the shoulder by exploding shrapnel, and was laid up five months. When he had sufficiently recovered to return to the front he decided to become an aviator, and accordingly entered the military training school at Pau. Since last summer he has been flying.

GERMANY

The following is a list of Zeppelin raids made over England since the outbreak of the European war. The dates and places visited appear to have been taken from official statistics. Many of the raids have never been reported here, the news being apparently suppressed by the censor. The raids on England reached the number of thirty-five. They were:

1915.

Jan. 19, 20—Yarmouth, Cromer, Sheringham, King's Lynn.
April 14, 15—Blyth, Bedlington, Morpeath, Cramlington, Wallsend, Hebburn.
April 15, 16—Maldon, Heybridge, Southwold, Lowestoft, Burnham, Yarmouth.
April 29, 30—Ipswich, Bury St. Edmunds, Whitton.
May 9, 10—Southend, Westcliffe, Mouth of the Thames.
May 16, 17—Ramsgate, Folkestone.
May 31, June 1—London.
June 4, 5—Mouth of the Humber, Harwich.
June 6, 7—Hull, Grimsby.
June 15, 16—Shields, Elswick-on-Tyne.
Aug. 9, 10—London, Mouth of the Thames, Harwich, Humber.
Aug. 12, 13—Harwich.
Aug. 17, 18—London, Woodbridge, Ipswich.
Sept. 7, 8—London.
September 8, 9—London, Norwich, Middlesborough.
Sept. 11, 12—London.
Sept. 13, 14—Southend.
Oct. 13, 14—London and suburbs, Ipswich.

1916.

Jan. 31, Feb. 1—Liverpool, Birkenhead, Manchester, Sheffield, Nottingham, Birmingham, Humber, Yarmouth.
March 5, 6—Hull.
March 31, April 1—London, Enfield, Waltham, Abbeg, Stowmarket, Lowestoft, Cambridge, Humber.
April 1, 2—Mouth of Tees, Middlesborough, Sunderland.
April 2, 3—London, Edinborough, Newcastle.
April 3, 4—Great Yarmouth.
April 5, 8—Whitby, Hull, Leeds.
April 24, 25—Cambridge, Norwich, Lincoln, Winterton, Ipswich, Norwich, Harwich.
April 25, 26—London, Colchester, Ramsgate.
May 2, 3—Middlesborough, Stokton, Sunderland, Hartlepool, Mouth of Tees, Firth of Forth.
July 28, 29—Lincoln, Grimsby, Immingham, Hull, Norwich.
July 31, Aug. 1—London, Mouth of Thames, Eastern Counties.
Aug. 2, 3—London, Harwich, Norwich, Lowestoft, Winterton.
Aug. 8, 9—Mouth of Tyne, Sunderland, Hartlepool, Middlesborough, Whitby, Hull, Grimsby, Mouth of Humber, King's Lynn, Eastern Counties.
Aug. 24—London.
Aug. 24, 25—London, Harwich, Folkestone, Dover.
Sept. 2, 3—London, Yarmouth, Harwich, Southeastern Counties, Humber.
Sept. 23, 24—London, Humber, Central Counties (Nottingham, Sheffield).
Sept. 25, 26—Portsmouth, fortified places at the mouth of the Thames, York, Leeds, Lincoln, Derby.
Oct. 1, 2—London, Humber.

In spite of the imposing appearance of the above list, the military results achieved are infinitesimal compared with the German loss of life and the number of Zeppelins brought down. There is not a detail of the construction, design, etc., of the Zeppelin that is not now known in England, and from our observation of the various tasks that the Zeppelins have been put to, and their success or failure at the tasks we may form the following conclusions:

1. As an actual machine of war; i. e., a raider over fortified sections, the Zeppelin is too slow and unwieldy. The rapid perfection of anti-aircraft guns by the Allies has made the position of the Zeppelin when near enough to the ground to do any actual damage on certain sections, almost nil, and in addition, the aeroplane can very easily outmanoeuver the Zeppelin, and flying over it drop bombs and send it to the ground.

2. As a long distance scouting machine the Zeppelin is very valuable, being able to carry superior wireless, can cover a greater territory than the aeroplane and is much faster than the torpedo boat or the cruiser. We all know now the part the Zeppelin played in the Jutland naval battle, where by discovering the approach of a superior British fleet, and communicating by wireless with the German vessels, it enabled them to withdraw before the British fleet had succeeded in reaching the battle-line.

There is an apparently authentic report in London that even Count Zeppelin himself has begun to believe that the Zeppelins are useless as raiders, as the English have perfected means of destroying them. It is an interesting fact, that there has been no Zeppelin raid attempted over England since the disastrous raid (to the Germans) of October 1st.

GREAT BRITAIN

On February 16th, perhaps for the first time in many months, the official report of the British War Department was given entirely to aeronautic work. The report follows:

"One British aeroplane and three German aeroplanes brought down down in air fights. Five other enemy machines were driven down damaged while a ninth was brought down by anti-aircraft guns."

Viscount and Lady Bryce, who were in Leeds recently, took the opportunity of visiting the Blackburn Aeroplane Co.'s works at Olympia. Lord Bryce was exceedingly interested in everything he saw, and in passing through the shops commented on the many labor saving devices now in use in the British aeronautical factories. He took particular notice of the propeller works, and also in the land machine being built for the Government of India on behalf of the merchants and manufacturers of the city of Leeds.

VERVILLE TYPE PUSHER SEAPLANE

FOR military purposes the tractor type of machine is limited to scouting and reconnaissance, its disadvantages being limited observation and firing range, caused by the position of the pilot and passenger and propeller mounting.

Flying boats, while offsetting the above disadvantages, are counteracted by the high net weight which limits the all important useful load.

The pusher seaplane presents the advantages sought for the following purposes, namely—bomb dropping, observation, reconnaissance, scouting and for combatative purposes against other aircraft. A machine gun placed in the nacelle of the pusher type seaplane permits of its most effective use, made possible by the unprecedented head-on arc of fire of 250 degrees. Its seaworthiness is indisputable because of the twin float system employed and the location of the nacelle. Lateral alighting ability is inherent by virtue of the relative position of float buoyancy of the center of gravity of the machine.

The Verville Type pusher seaplane and gun carrying machine, manufactured by the General Aeroplane Company of Detroit, accommodates pilot and passenger in tandem in a roomy, well-protected cockpit, so situated as to afford the maximum range of vision for both.

Materials used, silver spruce, white ash, oak, linen, dope, metal parts, etc., are selected from the finest stocks obtainable, with a high elastic limit and tensile strength.

Factor of safety seven. Double wiring throughout and safety factor taken on one wire. Cable joints wrapped with 24 gauge soft copper wire and sweated with solder. All joints at least 3 inches long. Control cable, ⅛" Roebling extra flexible. Turnbuckles, French National.

All metal parts treated with primer and baked with three coats of non-corroding enamel.

Tests of this machine have been carried out by Mr. J. D. Smith, licensed pilot No. 51.

General Dimensions

Span, upper plane	40'-0"
Span, lower plane	34'-0"
Chord	5'-0"
Gap	5'-0"
Length over all	23'-6"
Weight, unloaded	1,400 lbs.
Weight, loaded	2,000 lbs.
Motor, Curtiss Oxx-2	100 H.P.
Speed range, fully loaded	45-78 M.P.H.
Climbing Speed, 10 minutes	2,800 Ft.

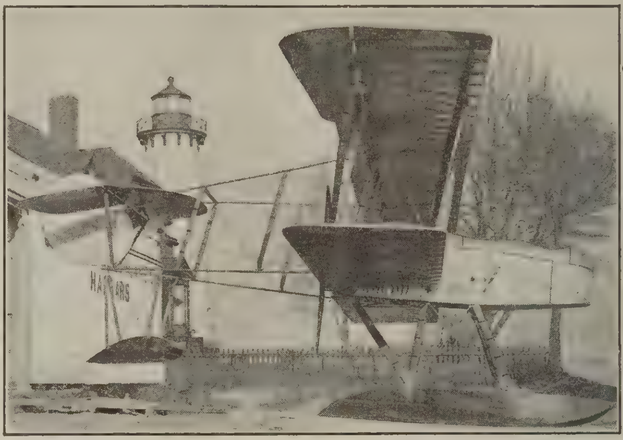
Planes

Highly efficient section permitting use of liberal sized I-beam section. Wing spars, spruce. Ribs, I section; spruce web and cap strips. Trailing edge, Shelby steel tubing. Internal drift wires, Robeling aviator wire. All internal wing structure treated with shellac.

Covering of unbleached Irish linen as specified by the British Government, having strength in weft of 91 lbs. per sq. in., and in warp of 103 lbs. Doped with 9 coats of Emillite and surfaced with 3 coats of Valspar, reducing friction to a minimum and rendering the planes impervious to the action of air and water. Linen stitched on with No. 8 Irish linen thread, at intervals of 4 inches along ribs, doing away with nails which tend to split ribs. This method also insures the staying qualities of the cloth to the wing structure and without injury, and at the same time permitting the easy recovering of planes. The linen is 36 inches wide, sewed on with English welt seam.

Wings can be treated with a compound which renders them transparent at a reasonable altitude.

Struts of well-seasoned Virginia silver spruce, with 3 rubbed coats of Valspar. Ends copper tipped. Struts bound at 12" intervals with 3 wraps of ¼-inch grey silk, to relieve shattering of wood fiber. Struts built of a 2½ to 1 series stream-line, of a weight-to-resistance ratio of 6. Strut wing fastening by metal bow wrapped with wing spars. This affords the advantage of a lift cable tension from neutral axis of wing spar. Lower wing beams extend through metal box at nacelle and are joined internally by steel casing.



Ailerons hinged to extremities of top wing at rear wing-spar by 5 cold-rolled steel hinges. Pylons; 2 sets mounted near aileron edge in steel casing. Equalizing ailerons controlled through aluminum pulley boxes and fare leaders along front spar of top wing; 2¼" Lynite pulleys used, having brass bushings.

Ailerons area 40 sq. ft.

Nacelle

Cellular nacelle constructed of ash and spruce covered with light gauge aluminum, or armored with chrome steel sandwich armor to suit military purposes. Engine covered by hinged cowel. Cockpits veneered with basswood and upholstered with green leather. Seats of aluminum bucket type, comfortably upholstered and seat cushions filled with Kopak, sufficient to float a 250 lb. man for 24 hours.

Engine bearers fitted in steel engine plate at rear of nacelle to which radiator is fitted. Bearers of laminated oak and spruce.

Dashboard of polished mahogany, equipped with altitude barometer recording to 1,500 ft.; Tycos inclinator, speed indicator and tachometer (Tel revolution indicator); gas line pressure gauge; eight-day clock; oil pressure gauge; electric light gang switch; dashboard light; motor cutout switch; hand throttle and magneto control. Four special Ever-Ready cells for dashboard light. Wing tip light, head and tail light. Hand pump convenient to pilot at side of nacelle.

Nacelle suitable for mounting machine-gun. Nacelle finished in battleship gray, or to taste.

Controls are of Deperdussin type, lateral balance on both upper planes.

Rudder area 12 sq. ft., Stabilizer area 18 sq. ft. Elevators 18 sq. ft. All constructed of Shelby steel tubing.

Pontoons

Factor of float buoyancy relative to full load of machine, 2¼ to 1. Main pontoons of twin float type, with 7 ft. tread, well braced to nacelle by stout stream-line members and counter wired oak ribs diagonally spruce planked and longitudinally planked with Honduras mahogany, two layers being interspersed with 4 oz. sheeting, treated with Jeffery's C quality marine glue. Floats divided into two compartments by an aluminum bulkhead and rendered accessible by two 4-inch aluminum inspection covers. Floats have Vee type entering edge, spreading to a flat surface at rear and are internally treated with boiled oil.

Tail float of mahogany, stream-line section, with a displacement capacity of 350 lbs.

For land use chassis can be substituted, of the wheel-and-skid type, two 26x5" Goodyear wheels sprung on tubular Shelby steel axle, split and hinged at center. Chassis stoutly thrust wired. Shock absorbers ½" Goodyear elastic chords wound around twin drums over axle head. Wheel hub of Manganese bronze. Wheels covered with aluminum discs. Shock-absorbing tail skid.

Motor Group

One hundred H. P. Curtiss OXX-2 direct driven to an 8 ft. diameter, 6 ft. pitch 2-blade flexing copper tipped Paragron propeller.

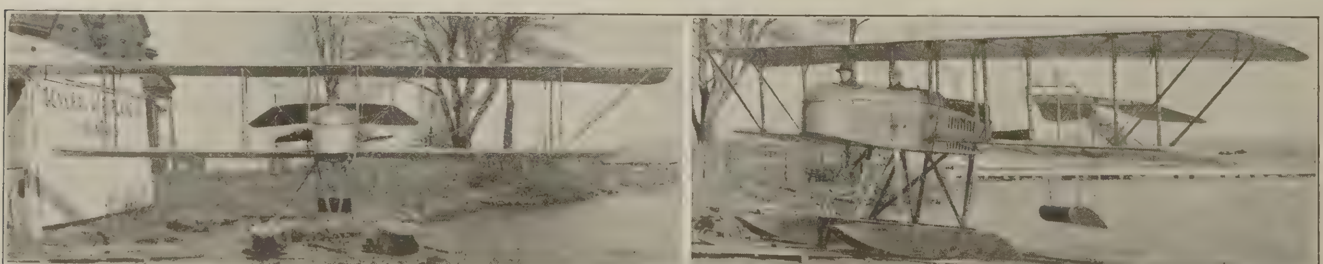
Radiator 24-gauge polished brass casing, 34-gauge copper cellular type. Water capacity 3 gals. Circulation obtained by direct motor driven centrifugal pump.

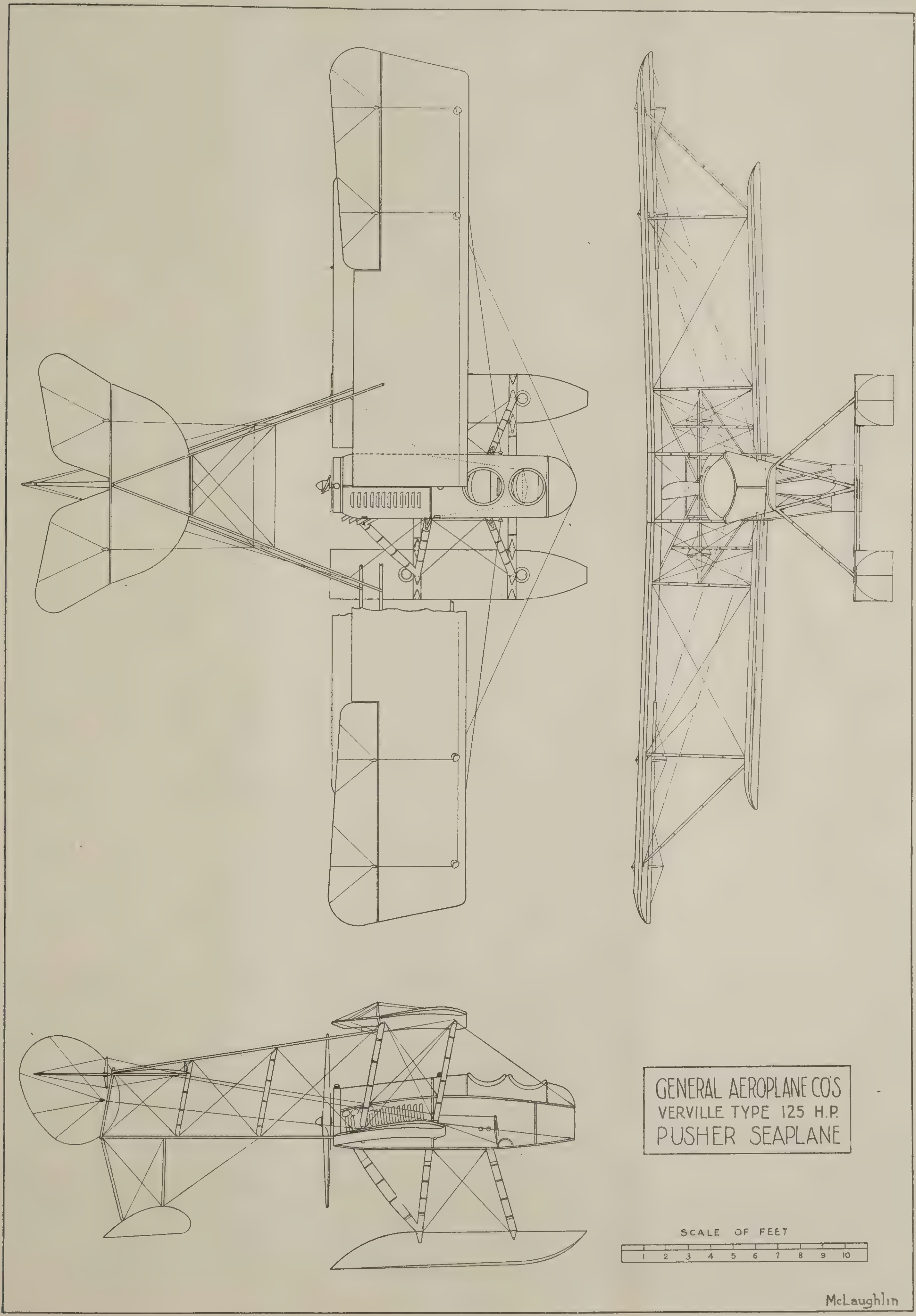
Fuel capacity 6 hours. Service tank 35 gals., of 22 gauge coated steel, equipped with baffle plates, capacity gauge, pressure gauge, auxiliary pressure pump, fitting and 5/16" carburetor outlet, 2¼" air-tight brass filler cap. Auxiliary 3 gal. gravity tank.

Crating for Shipment

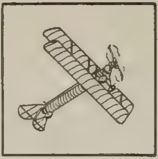
	Width	Height	Length
Wing Crate	5'-6"	3'-0"	20'-0"
Nacelle Crate	3'-0"	3'-0"	10'-0"
Motor Crate	3'-0"	3'-6"	5'-0"
Float Crates (2)	3'-0"	2'-0"	13'-0"
Strut Crate	3'-0"	2'-0"	13'-0"
Control Crate	2'-0"	5'-0"	10'-0"

Containing ailerons, stabilizer, elevators and rudders.





GENERAL AEROPLANE CO'S
VERVILLE TYPE 125 H.P.
PUSHER SEAPLANE



MODEL NEWS

Edited by G. A. Cavanagh

CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

TEXAS MODEL AERO CLUB
517 Navarro Street, San Antonio, Texas

SPRINGFIELD MODEL AERO CLUB
47 Churchill St., Springfield, Mass.

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

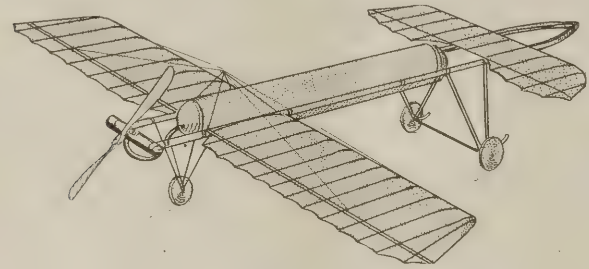
PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Models Exhibited at the Pan-American Exposition

There is little doubt but that the model aeroplanes exhibited at the Exposition have demonstrated the many ways in which models can be used. In fact every type of model, from an exact reproduction of a large machine to a racing type model, was to be seen, and the manner in which the various models were designed and constructed proved a great source of interest as well as information to those who visited the Exposition. In general, the model aeroplane representation illustrated the vast possibilities that exist in the model field from many standpoints, namely, scientific research, experimental, educational and sporting, etc.

One of the most interesting exhibits was that of the Wading River Manufacturing Company. This exhibit consisted of two splendidly constructed models representative of two classes, that of the sporting type and of the educational type. The one model was of the compressed air driven type and although it showed signs of considerable use it attracted much attention. The model measured approximately 56 inches in spread by 36 inches in length, the material used representing the best quality obtainable. For convenience the main wing is made in two sections and in such a manner that both can be adjusted to the body of the machine without impairing its rigidity. The power plant consists of a two-cylinder opposed motor designed especially for this type of model, the air being obtained from an 18-inch tank which is made to withstand a pressure up to 150 pounds per square inch. On several occasions excellent flights were made with this model and notwithstanding the use to which it has already been put it still maintains its flying ability.



Compressed Air-Driven Model Monoplane. Wading River Mfg. Co.

Gasoline-Driven Scale Model. Oscar W. Young

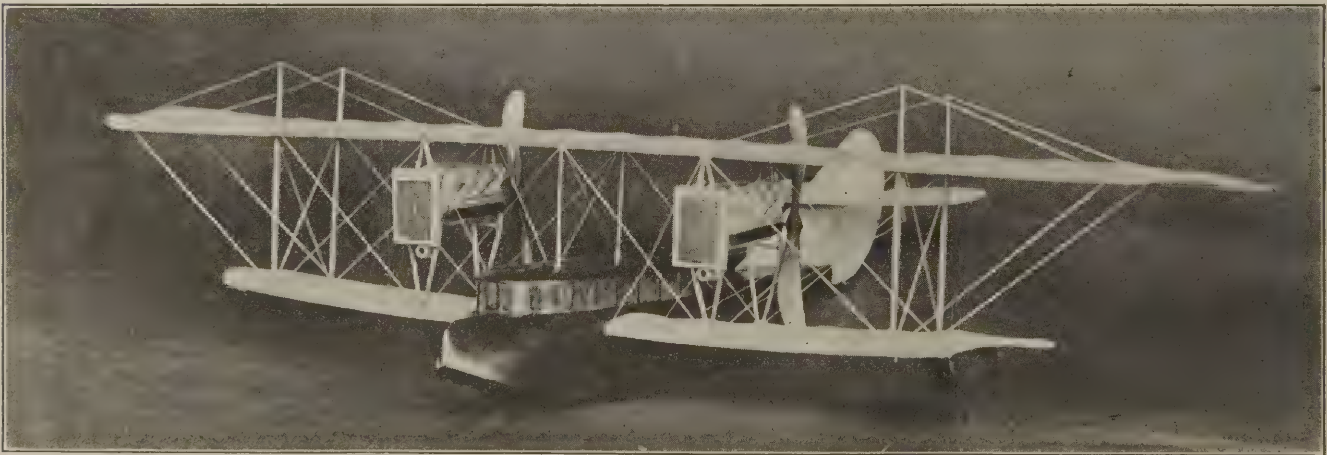
The second model exhibited by this company was designed and constructed expressly for educational purposes, and although it represents the standard type of machine many interesting features were apparent. The manner in which tail, flaps and ailerons were constructed and made to be operated in similar fashion to those of a full sized machine proved a source of considerable interest and it is safe to say that the model fairly represents a scale model. Everything from the wing frames down to the chassis was carefully designed and constructed so that it might justly fulfill the purpose for which it was built. A photograph and description of this model will appear in a later edition.

Another interested exhibit was that of A. G. Spalding Brothers, New York City, in which many different types of models were displayed. Among those models exhibited perhaps the most interesting one was that representing the Curtiss Twin Motored Flying Boat. From the illustration herewith it will be seen that this model sets forth a good example of fine workmanship.

And after passing the various exhibits of model "Blimps" Kite balloons and Zeppelins we come to the Young Gasoline Driven model. As will be remembered, this model was described in one of our issues at which time we gave a fair review of the dimensions and flying ability of the model, and we might add that the Government students at the Mineola school on Long Island have found the model an aid in their research work.

Our next stop is at the Booth of the Buck Aircraft and Munitions Corporation, where we find a model built entirely of steel and equipped with a single cylinder gasoline motor. Considerable interest was manifested in this model, and it is the intention of Dr. F. C. Buck, inventor and designer, to start construction of a large machine at an early date. Although the model is of the monoplane type, a biplane design may be used in the building of a large machine.

A scale model of the L. W. F. machine was also on review and proved very interesting. A complete description and photograph of this model will appear in a future issue.



Model of the Curtiss Twin-Motored Flying Boat

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Our Own Little Inventions. Group One.

Written by the Aeronitis Editor After a Week at the Aero Show.

We offer the following as but suggestions to inventors. But first we will tell you how we happened to think of them. For the past week or so, as our readers are aware, there has been going on the first Pan-American Aeronautic Exposition at the Grand Central Palace, and ye Editor has been in daily attendance. Although possessing the nature of an undertaker in a eugenic colony we have the misfortune to have a sort of sympathetic look about the face, and as a result have had exactly eighty-one inventors come up to us, show us inventions and then ask our opinion on the merits of the contraption. Right here we must admit that we know absolutely nothing about technical matters. The only thing we ever invented was a device consisting of some heavy pillows to throw at the alarm clock at 7 A. M. We have gazed in helpless stupidity at blue-prints; we have racked our brain to get some glimmering of an invention explained by a mechanic, half in French, half in English, and seven-eighths in gestures.

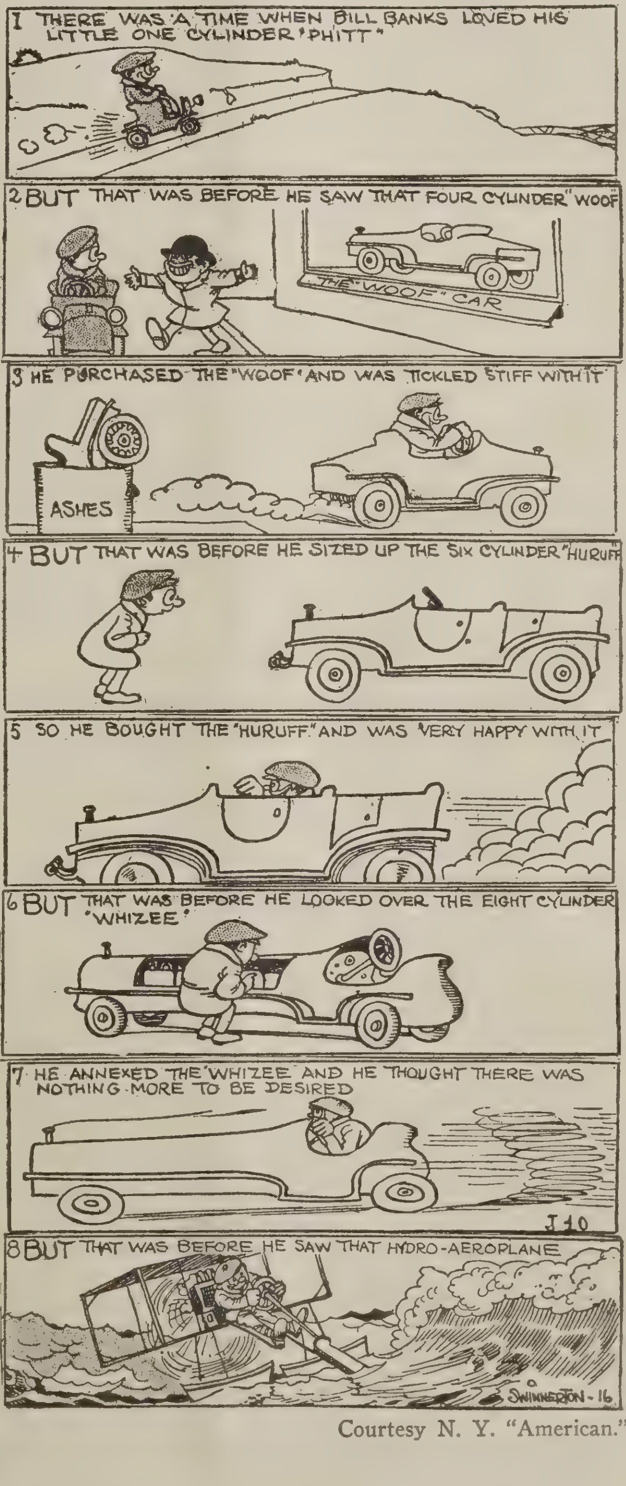
At first ye Aeronitis Editor tried to explain technical matters to enquirers instead of submitting them to Mr. McLaughlin, whose knowledge of such matters is nothing short of marvelous. If they asked us how many cylinders were in a certain motor, that was easy: we would just count them: add two for any that might be hidden from view, verify the result in the company's catalogue, and then announce the result gravely and cautiously, as if the fate of the country depended upon the matter. But then the questioner was liable to come back with a question about intake manifolds, two-cycle, four-cycle, and poppet valves and we were left dumb with consternation. (When the first person asked us what a two-cycle motor was we said that the word two was derived from the Latin—or is it Greek?—word BI, meaning two, as in Biped—a two legged creature, bi-annually—twice a year, etc. Continuing our derivation we announced that a *two* cycle motor was evidently a *bi*-cycle motor, but as there was no such thing as a bicycle motor, we stated that a two cycle motor was a motor-cycle engine!)

If a stabilizer was shown to use, we admired it with seeming fascination, for if we had ventured to state that we did not believe that the thing would work, we would have had to give reasons.

So after being shown so many things, it was but natural that we should figure out a few on our own hook. They follow.

Our first idea is for use in Zeppelins, kite balloons, sausage balloons, spherical balloons, rigid, non-rigid, semi-rigid, almost rigid, and ordinary loose, flapping, county-fair balloons. Our device is very simple. You fasten three hooks into the balloon fabric, the higher the better. On each hook you fasten a pulley, and through each pulley pass a rope capable of sustaining one thousand pounds. To the end of each rope you fasten said weights. Now we are ready to start. We have our balloon filled with a few dollars' worth of hydrogen. We then observe that the balloon will not ascend owing to the great weight of the three weights. NOW comes our invention! When we want to go up, we simply pull on each rope in turn. As the weight gets higher, the balloon will get higher, as the weights are tied to it. When we have reached the height we wish to attain, we simply let the weights down half-way. They are now in a sort of neutral position and will hold the balloon stationary. When we want to come down we simply let the weights into the bottom of the basket. That's all there is to it! Very simple, is it not?

There Was a Time


1 THERE WAS A TIME WHEN BILL BANKS LOVED HIS LITTLE ONE CYLINDER "PHITT"
2 BUT THAT WAS BEFORE HE SAW THAT FOUR CYLINDER "WOOF
THE "WOOF" CAR
3 HE PURCHASED THE "WOOF" AND WAS TICKLED STIFF WITH IT
ASHES
4 BUT THAT WAS BEFORE HE SIZED UP THE SIX CYLINDER "HURUFF
5 SO HE BOUGHT THE "HURUFF" AND WAS VERY HAPPY WITH IT
6 BUT THAT WAS BEFORE HE LOOKED OVER THE EIGHT CYLINDER "WHIZEE"
7 HE ANNEXED THE "WHIZEE" AND HE THOUGHT THERE WAS NOTHING MORE TO BE DESIRED
J 10
8 BUT THAT WAS BEFORE HE SAW THAT HYDRO-AEROPLANE
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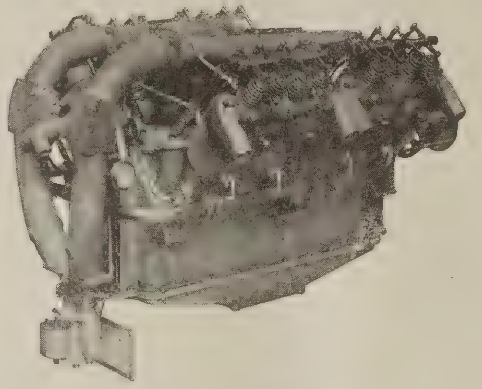

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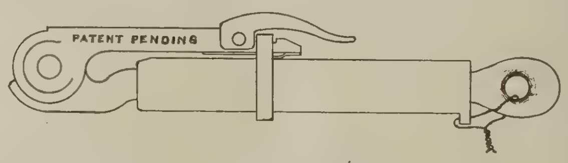

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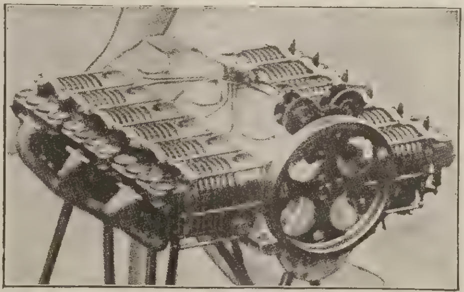

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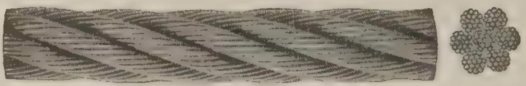

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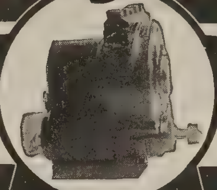

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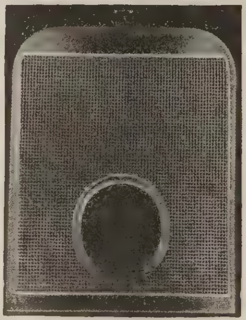

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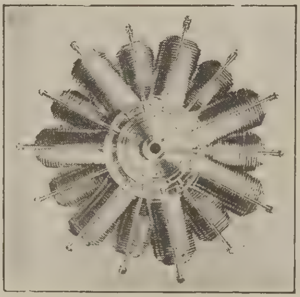

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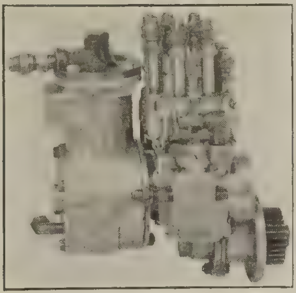

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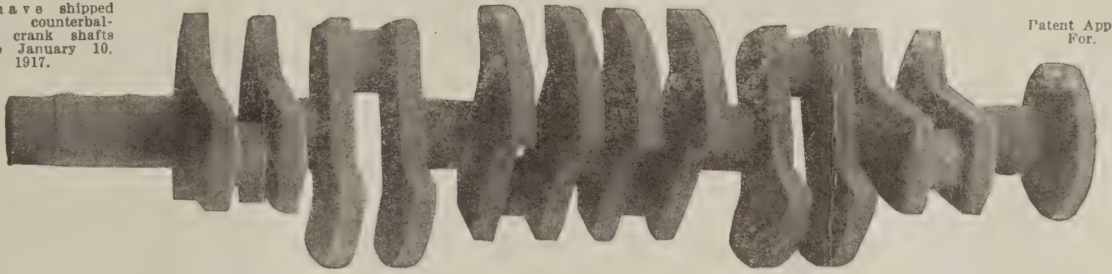

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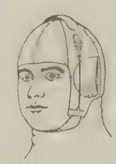

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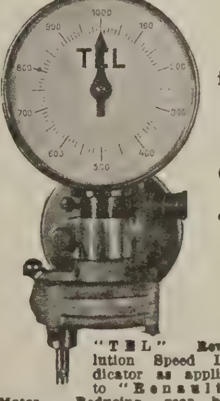

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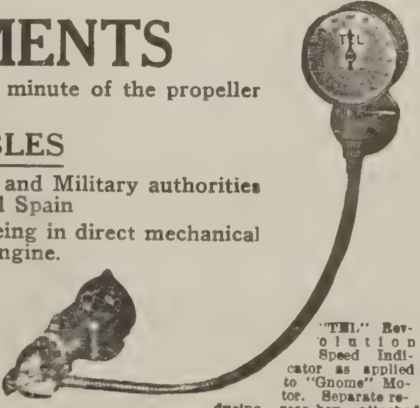

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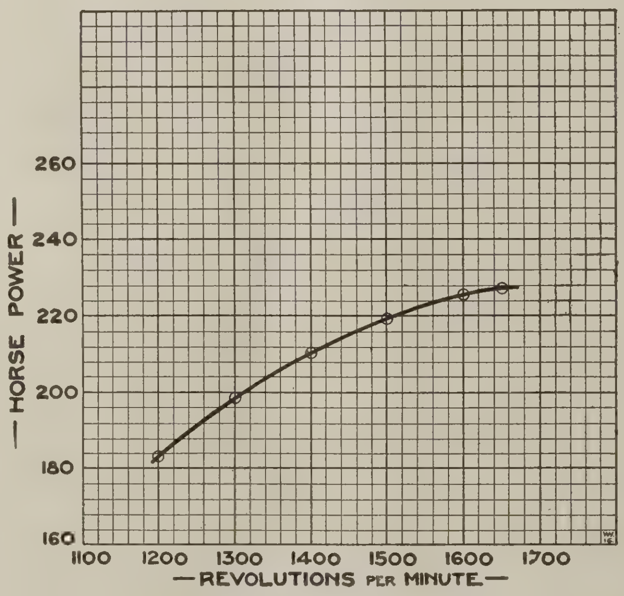

Duration of Test	1 hr.
Average R. P. M.	1403.33
Average Load on Scales (Lbs.)	449.64
Average Horse Power	**210.26**
Maximum Observed H.P. at 1400 R.P.M.	210.50
Minimum Observed H.P. at 1400 R.P.M.	208.10
Total Gas Consumption (Lbs.)	111.30
Total Gas Consumption (U. S. Gals.)	18.10
Gas Consumption Per Hour (Lbs.)	111.30
Gas Consumption Per Hour (U. S. Gals.)	18.10
Gas Consumption (Lbs. per H. P. Hour)	**.528**
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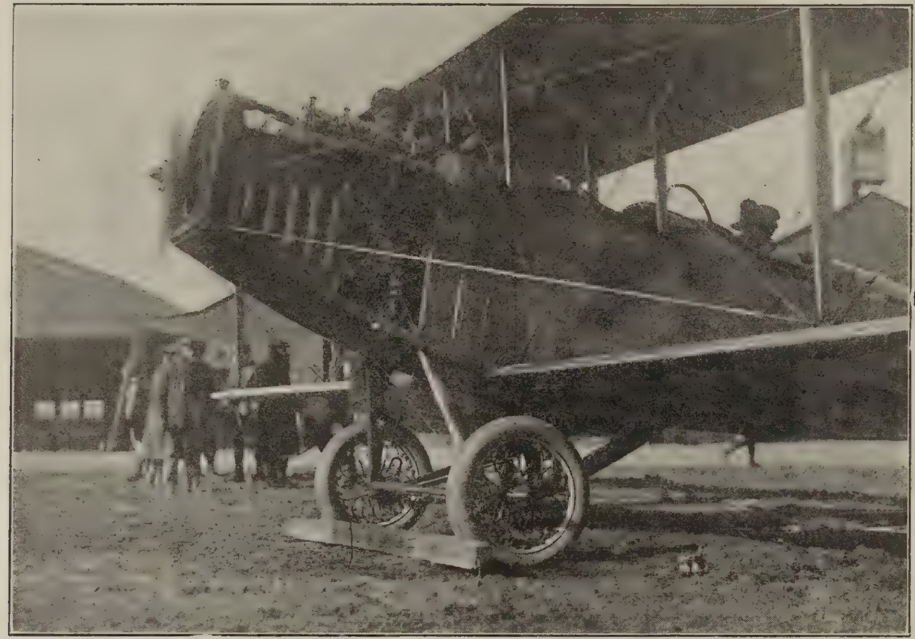

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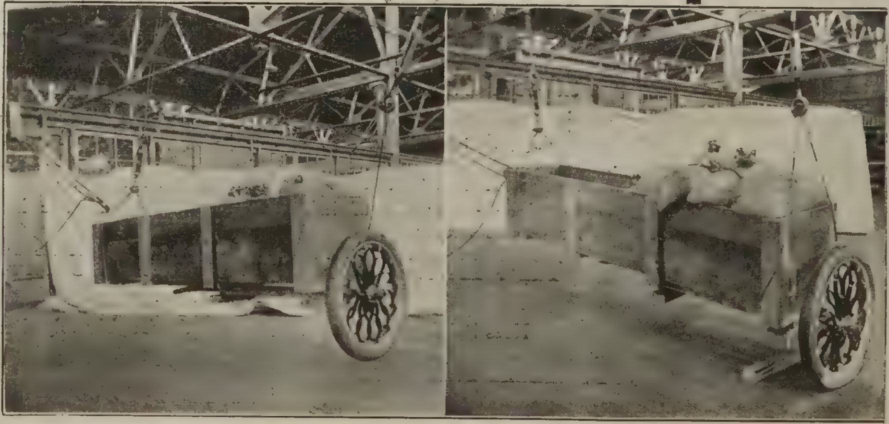

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VOL. IV NEW YORK, MARCH 5, 1917 No. 25

AERONAUTICS IN CONGRESS

Aeronautics was one of the subjects discussed in the House of Representatives on February 17th, the subject being to permit the Aviation Section to spend part of the unspent $6,000,000 for grounds.

The Clerk read as follows:

> *Provided further*, That the sum of $1,000,000 may be expended out of the appropriations provided by the act of August 29, 1916, for the purchase of sites and construction of buildings for aviation schools.

Mr. STAFFORD. Mr. Chairman, I reserve a point of order on the paragraph just read.

The CHAIRMAN. The gentleman from Wisconsin reserves a point of order.

Mr. STAFFORD. Before passing this item I wish to inquire what is purposed by the department in the item under consideration? I wish to inquire whether the department made any recommendation for an appropriation of $1,000,000 for purchase of sites and construction of buildings for the aviation school?

Mr. DENT. The department has made a recommendation, and I was just in the act of offering some amendments that would meet the recommendation of the War Department.

In the act of August 29, 1916, we made an appropriation of something over $13,000,000 for aviation purposes. The Comptroller has ruled that the department can not pay out of that sum any money for the purchase of sites, or for buildings in order to house the machines or to take care of them. The Secretary of War asks that so much of the appropriation made last year as will be necessary for that purpose be made immediately available in this bill out of the appropriation of last year. It does not increase the appropriation that we are giving in this bill.

Mr. STAFFORD. It is generally recognized that the entire amount of the money appropriated last year for aviation purposes will not be used this year, that a good portion of it, $3,000,000 or $4,000,000 or more perhaps, will lapse into the Treasury.

Mr. DENT. They will have about $6,000,000 left, and they want to use $4,500,000 of that for these purposes, and I was about to offer an amendment in order to meet the recommendation of the War Department on that subject.

Mr. STAFFORD. Before I withdraw the point of order I would like to hear the amendment read that is proposed to be offered.

Mr. DENT. I will offer the amendment first.

Mr. STAFFORD. The amendment can be read for information, but can not be offered while the point of order is pending.

The CHAIRMAN. The gentleman will send his amendment to the desk and it will be read. The Clerk will report the amendment.

The Clerk read as follows:

> Amendment by Mr. DENT: Page 8, line 13, strike out "$1,000,000" and insert in lieu thereof "$4,000,000"; page 8, line 14, after the word "appropriations," insert the words "for aviation"; page 8, line 16, after word "the," insert the words "acquisition by," and after the word "purchase" insert the words "condemnation or otherwise"; page 8, line 17, strike out the period and insert a comma after the word "schools," and add the following: "post experimental stations, and proving grounds for the United States Army."

Mr. STAFFORD. As I understand, these are read merely for information, Mr. Chairman. I think it is owing to the committee that some explanation be made of this radical amendment increasing the amount from $1,000,000 to $4,000,000. Is it purposed to increase these appropriations, as the Naval Affairs Committee increased their appropriation by some $15,000,000, as the result of afterthoughts of the department?

Mr. DENT. Of course, this does not increase the appropriation which was made last year. It is also true that if this sum is not used by the last of June it will be turned back into the Treasury.

This proposition has been submitted both to the Appropriations Committee and the Military Committee of the House by the Secretary of War, and he writes the following short letter:

> WAR DEPARTMENT,
> *Washington, January* 6, 1917.
>
> The SPEAKER OF THE HOUSE OF REPRESENTATIVES,
> *Washington, D. C.*
>
> SIR: I beg leave to inclose a suggested amendment to be incorporated into the urgent deficiency bill. The development of aviation in the Army of course depends upon suitable grounds, and throughout the United States there is now accumulating a very large amount of valuable property of the Aviation Section for which proper housing appliances are absolutely necessary. The appropriation made last year was a very ample provision for the purpose of machines, but made no provision for exercising grounds, storage facilities, etc. This amendment, if incorporated, will authorize the use of a part of the funds appropriated last year for those purposes and, of course, calls for no new appropriation, but merely larger authority with regard to the appropriation already made. The auditor and comptroller have already ruled that the funds appropriated last year, under the limitations contained in the appropriation bill, can not be expended for these purposes.
>
> Respectfully,
> NEWTON D. BAKER,
> *Secretary of War.*

Now, the Secretary of War not only wrote this letter, but he tells me that he must have this in order to properly house and take care of the machines.

Mr. ANTHONY. Will the gentleman yield?

Mr. DENT. Yes.

Mr. ANTHONY. Does the Secretary of War state where he desires to spend this increased appropriation?

Mr. DENT. He does not.

Mr. ANTHONY. Is not the whole matter in a very vague condition, and does the gentleman think we ought to appropriate this enormous sum of money for sites until the department states where they want the sites?

Mr. DENT. I think the matter is of such a character that it ought to be left to the discretion of the administrative officers.

Mr. STAFFORD. Will the gentleman yield?

Mr. DENT. Yes.

Mr. STAFFORD. Does not the amendment go further than provide sites for aviation? He could use the $4,000,000 for the purchase of posts and an experimental school for aviation. Further than that, the matter is before the Committee on Appropriations, which is at present considering the estimates by the department for urgent deficiencies.

Mr. DENT. I have recently had a conversation with the chairman of the Appropriations Committee, who tells me that he would not undertake to put anything of that kind in his bill, and he expects this to be taken care of in the Army appropriation bill.

Mr. CALDWELL. All the money appropriated by us, amounting to millions, has been spent, and a part of it is still under contract in the acquisition of certain aviation machinery that will deteriorate until it is housed. At present there are no houses for these machines, although we have the land for them. They must have the additional appropriation in order that the machinery, perishable property, exposed to the weather, may be properly taken care of—not only that which we have but that which is under contract and that which they expect to buy out of the appropriation.

Mr. SHALLENBERGER. Has the gentleman any information as to whether it will take one million or four million dollars?

Mr. CALDWELL. I understand the department asked for $4,500,000.

Mr. SHALLENBERGER. For housing this property or acquiring the ground?

Mr. CALDWELL. Both.

Mr. SHALLENBERGER. Did I understand the gentleman to say that there were six million left over of the appropriation of last year?

Mr. DENT. Yes; that is my information.

Mr. SHALLENBREGER. Then Congress voted that much more money than the department has found use for.

Mr. DENT. The department, as I understand, was under the impression that under the appropriation of last year they could use a portion of the fund for acquiring sites to erect buildings to house the machines. The comptroller has ruled that they can not, and the purpose of this amendment is to utilize the money for that purpose.

Mr. FIELDS. I want to say to the gentleman that $3,000,000 and over is asked to purchase sites.

Mr. GREENE of Vermont. The appropriation bill carrying that sum was approved August 9, 1916, so there has been no time to expend the money.

Mr. DENT. That is true; and when we had the Chief of the Signal Corps before the committee the law had been in operation only about five months.

Mr. CALDWELL. There was appropriated $14,281,000, and there are $6,000,000 not yet expended; and the comptroller said that under the wording of the bill it could not be used for the structures necessary.

Mr. McKENZIE. I would like to ask the gentleman if the Secretary of War or other officers have submitted any estimate in connection with the letter asking for the increased appropriation?

Mr. DENT. No; they have submitted no definite plan or proposal in regard to it.

Mr. McKENZIE. They are simply asking that we take $4,000,000 of the money appropriated last year for the construction of flying machines and turn it over to the War Department to expend in the purchase of land and the erection of buildings to take care of flying machines.

Mr. DENT. That is very true.

Mr. McKENZIE. Is it not a fact that when the matter was considered before the committee we felt that a million dollars was a very reasonable amount to turn over to them at this time for that purpose, and that we needed flying machines rather than land?

Mr. DENT. It is true that the committee thought that a million dollars would be sufficient, but we did not have any more information about it than the War Department has submitted to us now.

Mr. McKENZIE. Is it not a fact that they did not state at what point or places in the country the money was to be expended or the land purchased?

Mr. DENT. That is very true.

Mr. KAHN. Will the gentleman yield?

Mr. DENT. Yes.

Mr. KAHN. I think there was an estimate submitted to the committee of $3,000,000 to be appropriated out of the funds that were to go for the purchase of land and putting up the buildings during the fiscal year 1918.

Mr. FIELDS. That is correct.

Mr. KAHN. And therefore the War Department took cognizance of this subject in its estimates. The committee thought, in view of the testimony given before it by Gen. Squier, that probably they could utilize a sum of money appropriated last year for the purchase of land and the construction of buildings. In fact, the department or the bureau undertook to do that very thing out of the $13,000,000 appropriated, but the Comptroller of the Treasury held that under the wording of the law they could not do it. Therefore the department bought the flying machines but had no buildings in which to put them and no place to try them out at the various posts in the country. This money is now intended to allow the bureau to buy the necessary land and put up the necessary buildings to house the machines that will be required.

Mr. SHALLENBERGER. Mr. Chairman, will the gentleman yield?

Mr. KAHN. Yes.

Mr. SHALLENBERGER. Has the gentleman any information as to how much of the $4,500,000 is to be used for buildings and how much for land?

Mr. KAHN. I have not. I have simply the Secretary's letter for my guidance, which I heard the chairman of the committee read.

Mr. SHALLENBERGER. That gives no detail as to that proposition at all?

Mr. KAHN. No.

Mr. SHALLENBERGER. It simply asks for the money. Is the gentleman aware that the Government already has hundreds of reservations scattered all over the country?

Mr. KAHN. Oh, yes; I am quite aware of that. There is a reservation at Fort Sill, Okla., but I do not think the Government wants to take these machines out there and try them out. I do not think that would be a proper place for them. I rather think that the Government wants to try these machines out near the seaboard, where they will undoubtedly be used, and where the department will have to have land if they want to use them.

Mr. FIELDS. Is it not stated also that these sites would have to be purchased where the atmospheric conditions were favorable?

Mr. KAHN. That is only for the schools. After the men become expert fliers they can fly in any atmosphere.

Mr. SHALLENBERGER. Is it not a matter of record before the committee that they have already purchased a large site upon the Potomac?

Mr. KAHN. Yes; I believe at Hampton, Va.

Mr. SHALLENBERGER. For something like $350,000?

Mr. KAHN. I do not know how much they paid for it. There was an appropriation of $300,000 for that purpose. They have purchased that site; but if the gentleman knows anything about aeronautics, he must know they have to have large tracts of land near the posts where these machines are to be located in order to successfully maneuver and fly them, and those the Government does not happen to have at the present time.

Mr. McKENZIE. Mr. Chairman, will the gentleman yield?

Mr. KAHN. Yes.

Mr. McKENZIE. I desire to ask my colleague if, in his judgment, $1,000,000 would not be sufficient to erect shelter to cover all of the machines that we will have during the year 1918?

Mr. KAHN. Oh, possibly half a million dollars might do that. It might put up the buildings, but that does not get away from the fact that the department will have to have sufficient land area on which to fly these machines, and that land must be near the Army posts.

Mr. CALDWELL. Mr. Chairman, will the gentleman yield?

Mr. KAHN. Yes.

Mr. CALDWELL. Mr. Chairman, on page 999 of the hearings Gen. Scriven was before the committee, and the question of the use of this $3,000,000 that at that time was asked was under discussion. The general testified that in addition to the hangars in which the machines were to be kept there must be provided at Hampton workshops, experimental shops, places for storing ammunition, bombs, etc., and garages for the necessary automobiles and trucks. So that as I understand it this $4,500,000 they ask for, or the $4,000,000 proposed in this amendment, is for the purpose of putting up the necessary improvements to the real estate and the purchase of some small amount of land for the purpose of having the right kind of station or school for the aviation service. We have appropriated some $14,000,000 which they can spend between now and the 1st day of July, 1917.

Mr. SHALLENBERGER. Mr. Chairman, will the gentleman yield?

Mr. CALDWELL. In just a moment. If they go ahead spending the money for tools and for flying machines and all those things, they will have to be kept under canvas, as it is being kept, according to the testimony on the same page, at Columbus. If such course is pursued, we are wasting our money, throwing it away, and under these circumstances I think we ought to have a chance to vote upon it. I yield to the gentleman.

Mr. SHALLENBERGER. I want to ask the gentleman a question. He said this money they could spend. Has it not been demonstrated that they can not spend it, because they want to spend it now for something not appropriated for? They have not been able to find a place to spend it.

(*This money can be spent in training one thousand aviators, one thousand balloon operators and mechanics. Also in dirigibles and kite balloons.*—EDITOR.)

Mr. CALDWELL. I do not say that.

Mr. DENT. They were under the impression they could not spend it for this purpose until the comptroller gave his decision.

Mr. CALDWELL. We appropriated it upon their request a year ago, and now they want words put into the statute so that they can spend it as they contemplated a year ago.

Mr. HILLIARD. Mr. Chairman, this seems to be a very important subject and the Members ought to hear it. I make the point of order that there is no quorum present.

The CHAIRMAN. The gentleman from Colorado makes the point of order that there is no quorum present. The Chair will count. [After counting.] Sixty Members present, not a quorum. The Clerk will call the roll.

Mr. SAUNDERS, Chairman of the Committee of the Whole House on the state of the Union, reported that that committee, having under consideration the Army appropriation bill (H. R. 20783), finding itself without a quorum, he directed the roll to be called, whereupon 279 Members, a quorum, answered to their names, and he reported the names of the absentees to be entered on the Journal.

The SPEAKER. A quorum having appeared, the committee will resume its session.

The CHAIRMAN. The parliamentary status at the time the point of no quorum was made was that the gentleman from Alabama had submitted certain amendments to be read for information, and the point of order had been reserved to the section of the bill to which those amendments were directed. Does the gentleman from Wisconsin insist on his point of order?

Mr. STAFFORD. Mr. Chairman, from the discussion which has taken place since the point of order was reserved, it is apparent from the expressions that a great number of the members of the Committee on Military Affairs are opposed to this radical increase of appropriation from $1,000,000 to $4,000,000. I have examined the hearings and I find that the head of the service stated that there are some propositions under consideration which would involve, in case the tracts are purchased, the expenditure of more than $1,000,000, and unless I can have some understanding with the chairman of the committee that he will not press his amendment to increase the amount I shall feel constrained to make the point of order. Even though I dissent from this $1,000,000 of appropriation, I shall not oppose it; but I do not believe it is good legislation to come here merely upon the recommendation of the Secretary of War without any full consideration being given by the committee and increase that amount by $3,000,000.

Mr. DENT. Will the gentleman from Wisconsin accept an amount of $2,000,000?

Mr. STAFFORD. No; I think from expressions of members of the committee that this matter was considered by the committee, and it was decided by the committee that $1,000,000 should be the amount. In fact, there are members who have not participated in the discussion or given it consideration who are averse to this policy of expending these large amounts of money. I believe that it is necessary to allow the War Department to equip some building with the necessary machinery in conjunction with this aviation school so as to aid the aviation service in connection with the Army.

Mr. DENT. As I understand it they require some appropriation for houses that will house and take care of the machines, and this $1,000,000 will not take care of them, and if I insist on the amendment the gentleman will insist on the point of order?

Mr. STAFFORD. I will.

Mr. GARDNER. Mr. Chairman, I do not think this is subject to the point of order. The decisions are very clear. I refer the Chair to paragraphs 3591 and 3592 in volume 4 of Hinds' Precedents.

The CHAIRMAN. The gentleman reserved the point of order and never stated what his point of order was or to what language it was directed.

Mr. STAFFORD. The point of order is that it is new legislation not authorized by law, and that it is appropriating money carried in another appropriation act for a different purpose than what was stated in the original appropriation act.

Mr. GARDNER. Mr. Chairman, I read from decision No. 3591, fourth volume of Hinds' Precedents:

> The reappropriation of an unexpended balance for an object authorized by law may be made on an appropriation bill.
>
> And from paragraph 3592 of Hinds' Precedents:
>
> On February 14, 1907, the naval appropriation bill was under consideration in the Committee of the Whole House on the state of the Union, when the Clerk read as follows:
>
> Page 51, line 16, insert after the word "articles," "*And provided further,* That the unexpended balances under appropriations 'Provisions, Navy, for the fiscal years ending June 30, 1905, and 1906,' are hereby reapportioned for 'Provisions, Navy, for fiscal year ending June 30, 1908.' "
>
> Mr. JOHN J. FITZGERALD, of New York, made a point of order.
>
> After debate the Chairman (who was the Hon. James Breck Perkins, of New York) held:
>
> "The Chair is of the opinion that the question that has been raised has been covered by previous decisions of those occupying the chair, and in a moment the Chair will call the attention of the gentleman from New York to two decisions which he finds. In one of these decisions it was held: 'That a reapppropriation of an unexpended balance for an object authorized by law may be made on an appropriation bill.'
>
> "Now, in answer to the position stated by the gentleman from New York a moment ago, a second decision held 'That a reappropriation of a sum required by law to be covered into the Treasury was not a change of law.'
>
> "It seems to the Chair that these two decisions precisely cover the questions presented. Money has been appropriated for an object authorized by law and is now reappropriated for a similar object. That is the decision made by predecessors in the chair, and it has been held not to be a change of law and a thing that could properly be done upon an appropriation bill and the Chair therefore overrules the point of order."

The above decision from which I quoted directly says that a reappropriation of an unexpended balance for an object authorized by law may be made on an appropriation bill. The question arises whether this is or is not an appropriation authorized by law. I have not the Book of Estimates here, but the gentleman from Alabama can tell me the law under which the appropriation was made if he will look in the Book of Estimates.

Mr. KAHN. August 29, 1916.

Mr. GARDNER. August 29, 1916.

The CHAIRMAN. The Chair will ask in that connection if it is agreed that this sum of $1,000,000 is an unexpended balance. There is no controversy about that?

Mr. DENT. Yes.

The CHAIRMAN. Now, the application of that fund is to the purchase of sites and construction of buildings for the Aviation Corps. What is the authority for that application?

Mr. GARDNER. I am not sufficiently familiar with the act of August, 1916, to say from memory, but I can find the section in a minute or two.

Mr. DENT. I have not found it in the estimates. But I was going to make this statement, Mr. Chairman. As I understand it, the appropriation carried in the appropriation bill for the support of the Army, of August 29 of last year, provided generally for so many millions of dollars for this purpose, and the comptroller has ruled that under that appropriation they can not purchase any sites or erect any

(*Continued on page* 731)

Senator Chamberlain Endorses Aero Club Program

SENATOR GEORGE E. CHAMBERLAIN, the Chairman of the Senate Committee on Military Affairs, has written to Mr. Alan R. Hawley, President, Aero Club of America, approving the Club's request for an increase in the appropriation for military aeronautics to $50,000,000, and urging that universal training be established to get the thousand aviators and the thousand balloon operators and five thousand mechanics needed to give the Army this year the substantial air service which it should have at present to meet the national emergency.

Senator Chamberlain's letter, which is in answer to Mr. Hawley's telegram to the Senate Committee on Military Affairs, urging the appropriation of $50,000,000 for aeronautics and the establishing of universal training, reads as follows:

> "I will be very glad to submit your telegram to the War Department for its information and advice. However strongly I may feel that our nation is practically equipped as to men and machinery for defense, I cannot close my eyes to the fact that in a democracy necessities cannot be obtained without agitation and education. So it is in your campaign for more money for aeroplanes. You must make the people understand and appreciate the necessities as you and I understand them. Men of preeminent ability and influence are abroad at this very moment, at the most critical time in our history, practically opposing anything like better preparedness. Nothing but the actual clash of arms will arouse our people to a realization of their real weakness. It was so with Great Britain; it will always be so in a democracy.
>
> "I am earnestly hoping I may get before the Senate a bill for universal military training, but I have no hope of getting it through at this session. It will at least afford a basis for a discussion of the subject between now and the convening of the next Congress.
>
> "I have the honor to remain,
>
> "Yours very sincerely,
> (Signed) "GEO. E. CHAMBERLAIN."

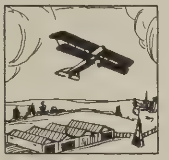
Mrs. Van Renssaelaer Urges One Thousand Balloon Operators

THE following letter urging universal training as a means of securing the one thousand balloon operators needed by the Army and Navy has been sent by Mrs. Charles A. Van Renssaelaer, Chairman, Committee on Training Camps for Kite Balloon Operators, to President Wilson, Senator George E. Chamberlain, Chairman of the Senate Committee on Military Affairs, Congressman Hubert E. Dent, Chairman of the House Committee on Military Affairs, Secretary of War Baker, Secretary Daniels, and the Council of National Defense:

> "In connection with our work to establish Training Camps for Balloon Operators, we find that the only hope of getting the 1000 balloon operators needed to supply 'aerial eyes' for our coast and field artillery and our fleet is Universal Training.
>
> "The present national emergency has found this country entirely unprepared in the matter of operators for observation balloons for coast and field artillery, mine planting and submarine spotting—and this unpreparedness undermines our already weak defenses.
>
> "The Army and Navy have only two balloon operators each, who, on account of the shortage of personnel, must perform other duties, and therefore, have not been able to proceed with training other operators. As a result, the 73 forts of our Coast artillery which should have two balloons each, 336 in all, have not one, and are blind, as it were, so that the territory which they should protect would be at the mercy of the long-range guns of vessels lying beyond the point of vision of the artillery observers station in the forts. There are hundreds of millions of dollars invested in the coast artillery and field artillery which would be ineffective without the aerial auxiliary.
>
> "The Aero Club of America, after investigating the matter, reported that owing to the fact that our small Army is overburdened with work at the present time, there are no prospects of getting balloon operators needed this year or next, unless a training school is established on the order of the Plattsburg Training Camp, to train civilian operators, who will then join the Aerial Reserve Corps.
>
> "Our Committee was formed to raise the funds to establish training camps for balloon operators, as a step towards supplying the 73 forts of our coast artillery system and the 45 batteries of field artillery with observation balloons. But we feel that the Government should do this work, and that, whereas the problem of getting the necessary men for our Army and Navy can only be solved by universal training, no time should be lost in establishing universal training. The Committee hopes, therefore, that you will give your approval to the Universal Training Plan.
>
> "Very sincerely yours,
> (Signed) "CAROLINE E. VAN RENSSELAER,"
> Chairman, Committee on Training Camps
> for Kite Balloon Operators.

The Committee on Training Camps for Kite Balloon Operators consists of: Mrs. Charles A. Van Rensselaer, Chairman; Dr. Richard Darby, Rear Admiral Bradley E. Fiske, Mr. Alan R. Hawley, Mr. Colgate Hoyt, Jr., Rear Admiral Robert E. Peary, Mr. Seth Low Pierrepont, Mr. James Lowell Putnam, Mr. Latham R. Reed, Mr. Henry Woodhouse, Major Charles Elliot Warren, Treasurer; Mrs. William H. Bliss, Mrs. William Hoppin, Mrs. Reginald De Koven, Mrs. William Forbes Morgan, Jr.; Miss Marie A. Peary, Mrs. Seth Low Pierrepont, Mrs. James Lowell Putnam, Mrs. Henry A. Wise Wood.

The Committee has already raised $10,000 with which to establish a training camp to train twenty balloon operators in New York, and is planning to establish other training camps throughout the country.



THE NEWS OF THE WEEK

Unenlisted Men for Aviators

Legislation to enable the army to develop operations of aeroplanes and other aircraft without the necessity of army enlistment was strongly urged upon the House, February 22, by Representative James R. Mann, of Illinois, Republican floor leader.

During consideration of the Army Appropriation Bill, Representative Crago, Republican, of Pennsylvania, proposed an amendment to appropriate $1,000,000 for aviation purposes in the National Guard. Representative McKellar, democrat, of Tennessee, member of the Military Affairs Committee, vigorously opposed the amendment and finally made a point of order against it, which was sustained. He declared that the aviation profession was too dangerous to be placed in the hands of the National Guard and should be left to the regulars.

Representative Mann, while expressing doubt as to the wisdom of Crago amendment, declared that some legislation should be enacted to authorize the army to train unenlisted volunteer aviators.

"The Army Aviation Corps should be permitted to take civilians who wish to learn flying and test them," said Mr. Mann. "They should not be required to enlist, but if they want to fly they should be trained by army aviators. It has been said that fliers are born, not made, but all fliers need training. These born fliers should be taken in hand. You could educate men in this chamber for forty years, but they could not learn to fly.

"There are many people who feel perfectly at home in a flying machines at an altitude of 10,000 feet, and whether the machine is right side up, wrong side up or sidewise. The army should have a chance to get hold of these men if they are willing to be tested. The Aviation Corps should be given an opportunity of trying out these men so as to find out whether they can become fliers."

Aviators Help Red Cross

The Army Aviation Service, through the Nassau County Chapter of Red Cross, has expressed its appreciation of the importance of supporting the humanitarian arm of the War Department. The members of the aviation camp that are carrying on intensive training on the Hemptsead Plains, near Mineola, L. I., have responded to the appeal made by Mrs. W. Albert Pease, Jr., of Hempstead, Chairman of the Nassau Chapter, and have enrolled as members of the society.

The object of this campaign is not only to get funds to procure that portion of the hospital equipment that has been purchased, but also to get workers to make the bandages and other dressings that are needed. The work-room of the chapter at Hempstead is crowded these days with women who not only have busy hands making articles to alleviate suffering, but who are also occupying their minds in learning first aid and how to care for the sick.

Naval Research Laboratory

The report of the special board named to investigate and report on a suitable site for the proposed Naval Research Laboratory has been handed to the Secretary of the Navy, but it may be two weeks before the findings are made public. Department and bureau officials favor locating the laboratory in Washington, and it is thought the chances are that the board will recommend the expenditure of the $1,500,000 appropriated for the structure in the district. The city of Annapolis, however, has been urgent in presenting its claims on the ground especially that the laboratory should be an adjunct to the Naval Academy. Prominent Annapolitans who have been interested in the matter believe they have the assurance of Secretary Daniels that he favors some point on the Naval Academy government reservation as a site.

Army and Navy News

Capt. John W. Butts, S. C., now on leave at New Rochelle, N. Y., is relieved from duty in the Southern Department and will proceed to Mineola, Long Island, N. Y., for duty. (Feb. 16, War D.)

Sergt. 1st Class Edward Ward, S. C., now in Washington, when his services can be spared, to Fort Omaha, Neb., for duty at the U. S. Army Balloon School. (Feb. 19, War D.)

With Lieut. Herbert A. Dargue, Aviation Section, U.S.A., acting as pilot, E. J. Simon, a radio engineer of New York, temporarily attached to the Army Aviation School at San Diego, Cal., has sent a radio message from an aeroplane over a distance of 112 miles to the receiving station at the school. The current for the sending set was derived from a small generator driven by a two-blade wind propeller.

The training of twenty-seven of the recruit aviators who have enlisted in the Aviation Section, U.S.A., began Feb. 19, at Hempstead Plains, N. Y. Lieut. Joseph E. Carberry, in command of the Aviation School, will employ the training methods of the French army flying corps.

Lieut. Col. John B. Bennett, Inf., U.S.A., was placed in charge of the Aeronautical Division in the Chief Signal Officer's office on Feb. 19. He had been mentioned for this position, but more persistently as the probable successor of Brig. Gen. George O. Squier as Chief of the Aviation Section.

The "North Carolina's" catapult is being overhauled and strengthened, and there is so much work still to be done in the engine room that she will probably be granted an extension of sixty working days at the Portsmouth Yard.

The U. S. S. "Seattle" left Portsmouth, N. H., with five Curtiss seaplanes aboard and proceeded to Hampton Roads, Va., where she took on five spare aeroplane motors before joining the fleet off the Virginia Capes. From there she went southward to Culebra, and thence on among the islands, taking part in the war game and using her 'planes frequently. Guantanamo Bay is the final objective.

Rear Admiral Gleaves, in command of the torpedo flotilla, is making the "Seattle" his flagship. The Admiral is greatly interested in aeronautics.

U. S. Flying School May be Opened at the Squantum Aviation Field

That a government flying school may be opened at the aviation grounds at Squantum if the number of Harvard men who signify their desire to join the aviation corps is satisfactory to the government, became known recently.

Harvard students are arranging for the formation of a university flying unit. Over 150 are interested and many of them have already signed petition blanks for membership in the Harvard Corps when it is definitely organized.

Plans announced by the war department call for the establishment of aviation schools to train army aeronauts in various parts of the country and an appropriation of $13,000,000 has been made.

Officers Drift 165 Miles in Air

Two naval officers, adrift in a balloon, landed near Tyson, a small station fifteen miles south of Montgomery, Alabama, on February 18.

The men were making observations from their balloon, anchored near Pensacola, when the aircraft pulled the fastenings free.

They drifted about 165 miles before being able to effect a landing. Neither was injured.

To Fight Metric System

The American Institute of Weights and Measures was organized at a meeting of engineers and manufacturers in New York recently. The movement is designed to counteract efforts to have the metric system of weights and measures adopted by American industry and commerce. The organizers asserted that the adoption of the metric system would result in the use of the old and new systems, and would bring about confusion. The institute will open offices in this city at once, and will begin an aggressive campaign.

The officers elected by the new institute were: President, W. R. Ingalls, editor of *The Engineering and Mining Journal* and President of the Mining and Metallurgical Society of America; vice-presidents, Henry D. Sharp, treasurer of the Browne & Sharp Manufacturing Company, and D. H. Kelly, secretary of the Toledo Scale Company; treasurer, W. M. McFarland of the Babcock & Wilcox Company; commissioner and secretary, F. A. Halsey.

Army Heads Plan for Placing Guns to Fight Aircraft

Department commanders in the United States and at overseas posts have been ordered by the War Department to report what points under their jurisdiction should be provided with anti-aircraft guns under the authorization for purchase of 130 for continental United States, eight for the Canal Zone and seventeen for the insular possessions.

The War Department has placed orders also for forty-six 9.5-inch field howitzers of a type said to equal the 11-inch guns of similar design in use abroad. The Bethlehem Steel Company will furnish twenty-six and the Midvale company twenty. They are to be drawn by motor tractors.

It was announced that three American army officers—Lieutenants Joseph E. Carberry, of the aviation section, and Willard F. Harmon, jr., and Davenport Johnson, infantrymen, all now on border duty, have been ordered to France for instruction in flying at French military aviation schools.

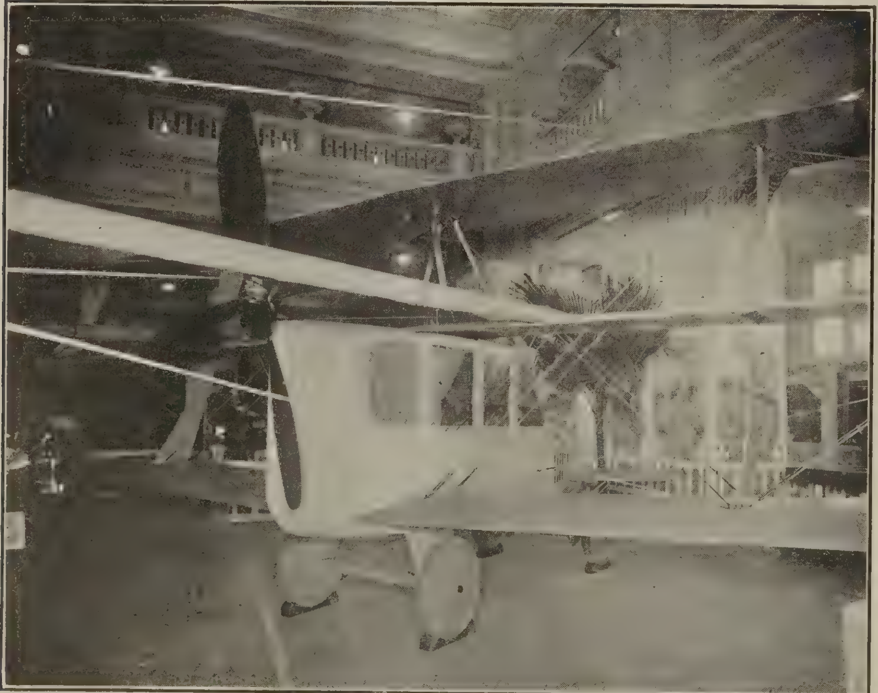
Metric or English Dimensions in Aeronautic Standards

The Aeronautic Division of the Standards Committee, having found that before it can proceed effectively, it is essential that a decision shall be made whether aeronautic standards shall be expressed basically in English or metric dimensions, held a session this month at the rooms of the National Advisory Committee for Aeronautics, in Washington, at which this general question was discussed. The U. S. Government departments concerned, as well as many companies manufacturing aeroplanes and parts and materials therefor, were asked to send representatives. Thirty-three men attended the conference, the presiding officer being Charles M. Manly, chairman of the S. A. E. Aeronautic Division. Although incidental discussion as to the general commercial adoption of the metric system was interjected, the question before the meeting was the dimensions system to be used basically in aeronautic standards, this depending on which system shall be followed ultimately in aeroplane design. The majority of the representatives of both the Government departments and the manufacturing companies favored following the recommendation of the National Advisory Committee for Aeronautics that metric units should be the basis of design in aeronautics. The representatives of the Navy Department did not, however, concur in this view.

The attitude of the Army Signal Corps is indicated by an order issued in November to its Engineering Division that all drawings and specifications for aircraft or component parts shall be made in the metric system, with the English equivalents in parenthesis. Nearly all the manufacturing representatives expressed the view that if the metric system is to be followed in design eventually, it will be decidedly better to adopt it now before large production by various companies begins. The attitude of the Navy Department appeared to be that if the metric system is to be adopted in aeronautics, it should be adopted throughout the department, its aircraft being part of the fleet.

It is understood that until a satisfactory metric fine-pitch thread system is developed, the S. A. E. standard fine-pitch screw threads shall be used in aeronautic practice, except in the case of the spark-plug shell thread.

Those present were: Henry Souther, Aviation Section, War Department; Capt. V. E. Clark, U.S.A., Aviation Section, War Department; Lieut. W. G. Child, U.S.N.; Naval Constructor J. C. Hunsaker, U. S. N.; Prof. Charles F. Marvin, Weather Bureau; Dr. S. W. Stratton, Director, Bureau of Standards; Henry D. Hubbard, secretary, Bureau of Standards; Prof. J. H. Nelson, Bureau of Standards; L. A. Fischer, Bureau of Standards; Dr. P. G. Agnew, Bureau of Standards; G. Douglas Wardrop, Aerial Age Co.; Evan J. David, Flying Association; Capt. Horace B. Wild, International Aircraft Co.; Stanley H. Page, Union Gas Engine Co.; Thomas H. Huff, Standard Aero Corp.; J. E. Diamond, Aluminum Castings Co.; H. E. Mortin, B. F. Sturtevant Co.; G. C. Loening, B. F. Sturtevant Co.; Charles M. Manly, Curtiss Aeroplane and Motor Corp.; Coker F. Clarkson, General Manager, Society of Automobile Engineers; E. G. Gunn, Premier Motor Corporation; Tom W. Benoist, Benoist Aeroplane Co.; Henry N. Atwood, Atwood Aeronautic Co.; Leigh M. Griffith, Griffith Machine Works; Henry M. Crane, Wright-Martin Aircraft Corp.; F. E. Queeney, General Vehicle Co.; A. C. Woodbury, Recorder Standards Committee, Society of Automobile Engineers; William B. Stout, Packard Motor Car Co.; Raymond Ware, Thomas-Morse Aircraft Co.; A. V. Verville, General Aeroplane Co.; Corwin Van Husan, General Aeroplane Co.; F. K. Lord, Duesenberg Motor Co.; H. A. Bubb, Atwood Aeronautic Co.


Detail view of the rear of the Curtiss Autoplane, which was fully described in Aerial Age for February 19.

The Late Edgar B. Bronson

Through the death of Edgar B. Bronson, the Aero Club of America has lost one of its most enthusiastic members, and aeronautics one of its most loyal supporters.

Mr. Bronson never forgot his sensations when as a newspaper man on the New York *Tribune* he was assigned to take a balloon trip with the famous aeronaut Donaldson in 1877. The pair made the longest trip to that date when they finally landed in Poughkeepsie. The trip won Mr. Bronson to the study of aeronautics and years later he became one of the charter members of the Aero Club.

Clarence Bronson, the elder son of Mr. Bronson, a Lieutenant in the United States Navy, attached to the Aeronautical Corps, was killed while making experimental flights dropping bombs at targets in the Potomac River last November. Lieutenant Bronson was accompanied by Lieutenant Welch, who was making the bomb tests. On the third trial one of the bombs went off just under the aeroplane and broke off half of a wing. Both occupants were drowned.

"Detector" to Save City from Peril of Aerial Raids

The protection of New York City from attack by an enemy's swift flying aeroplanes or by dirigibles has been so carefully studied by officers of both the Army and the Navy that already devices to detect the presence of flying machines within a dangerous area are now being tried out at Governors Island.

During the daytime a certain amount of reliance is to be placed upon observers stationed at various vantage points in the city and its environments, but such precautions are unavailing at night. For this reason detectors which shall "hear" the approach of a hostile machine are now engrossing the attention of the officers of the two services.

The device which has, so far, given the best results, was tried out recently.

It consists of a micro-telephone and four great megaphones, the latter six feet long and three feet wide across the mouth. When these four horns are set up their smaller ends converge upon the microphone. The ordinary telephone, in transmitting the sound of the voice relies upon one electrical contact to catch the voice in audible volume. A microphone employs several hundred such contacts, thereby magnifying the instrument's ability to catch the slightest sound.

From the microphone extend several lines of small rubber tubing equipped with ear pieces to be inserted well within the ear so that nearby sounds may be completely shut off. This part of the appliance is like the ear tubes attached to the penny-in-the-slot phonographs to be found in arcades all over the city.

This detecting device has been set up at one side of the large parade ground on Governor's Island, and one of the members of the Aviation Corps was sent up to test the "hearing" qualities of the mechanism.

At the beginning of his flight the aviator flew comparatively low over the device, and the roar of his propeller blades was almost deafening to the officers who were using the ear pieces. In long slants the aeroplane was sent upward, crossing and recrossing the spot at which the detector was installed, and during the flight, when those on the ground could not hear the least sound of the propeller, the detector caught its beats and made them distinctly audible to the listeners.

At 7,000, 8,000 and even 9,000 feet, when the aviator was a mere speck against the sky, the four big megaphones caught the noise of his engine. As he drove his biplane far down toward the Narrows and then a long distance toward the New Jersey shore and doubled back by Staten Island the microphones "heard" him.

When he rose to a height of 11,000 feet it was scarcely possible to catch the beat of the blades. Experiments were then made to determine, by turning the megaphones, the direction from which the sound came, and in this the device was equally efficient.

THE SIMPLEX HISPANO-SUIZA MOTORS

Much interest has surrounded the development in this country of the Hispano-Suiza aviation motor by the Wright-Martin Aircraft Corporation, consequently the following description of these motors, issued by the company constructing them, is of timely interest.

The development of the aeroplane itself was so rapid that it outstripped the progress in internal combustion engines. Millions were next spent in research and experiment to bring aeronautical engines to a degree of efficiency equal to that reached by the machine.

The new Hispano-Suiza engine represents the greatest development in engine practice abroad, where the extraordinary advancment of the aeronautical industry, due to the war, has far surpassed that in this country.

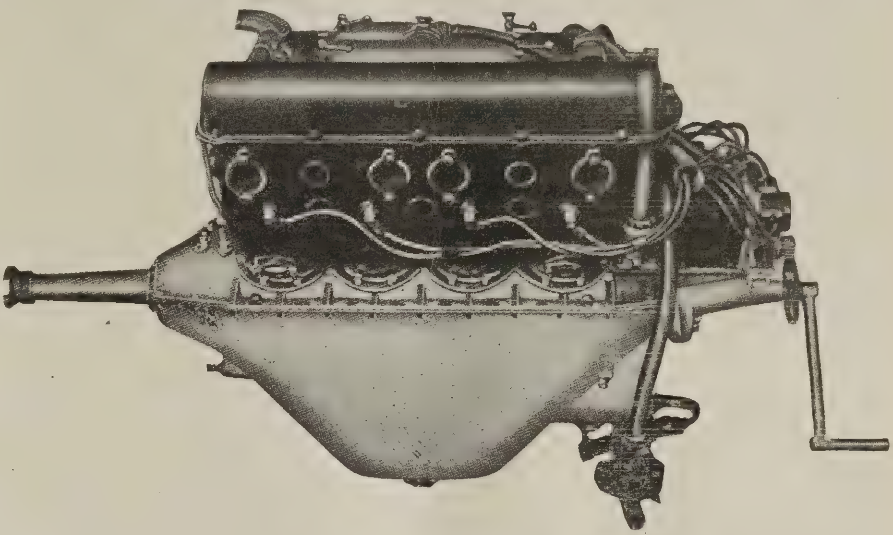
The success of the Hispano-Suiza engine has been such that the French War Office and the Aviation Commission representing England, Russia, Roumania, Italy and other countries seem disposed to concentrate all orders on that one engine for the year 1917.

This engine has been used in the wonderful military non-stop flights of which we occasionally hear despite the fact that they are so frequent that they usually fail to attract more than passing attention. One of the latest biplane fighting machines climbs, with this engine, 13,000 feet in seventeen and a half minutes—a new record. The same machine flies at 109 miles an hour at 6,500 feet altitude, and 104 miles at an altitude of 13,000 feet, with more than 800 pounds of useful load in addition to fuel and oil for two and a half hours.

The Hispano-Suiza engine insures that confidence which makes possible the raids into enemy territory for hundreds of miles with a safe return: flights like that of Captain de Beauchamp from the French lines to Essen and return without stop and from Nancy to Munich and over the Alps to Venice, 500 and 435 miles respectively, without a miss—to cite but a few of the numerous examples.

The engine is the crux of the aeroplane problem. The Wright Company was cognizant of the inadvisability of producing aeroplanes unless they could be equipped with a real modern engine, and it was obvious that it must manufacture its own. And to this end it acquired the Simplex Automobile Company, long builders of the highest grade automobile in this country embodying a standard of work comparable only with that necessary in a modern aeronautic motor.

The company also acquired the rights for the United States and other countries for the Hispano-Suiza engine which is much lighter per horsepower and has given better results under test and at the front than any other aeronautical motor manufactured. These engines are now being produced at the Simplex plant of the company in two sizes—150 and 75 horsepower.



Simplex Model "A" Hispano-Suiza

The Model A is of the water-cooled four-cycle Vee type, with eight cylinders, 4.7245 inch bore by 5.1182 inch stroke, piston displacement 718 cubic inches. At sea level it develops 150 h.p. at 1,450 r.p.m. It can be run successfully at much higher speeds, depending on propeller design and gearing, developing proportionately increased power. The weight, including carburetor, two magnetos, propeller hub, starting magneto and crank, but without radiator, water or oil or exhaust pipes, is 445 lbs. Average fuel consumption is .5 pounds per horsepower hour and the oil consumption at 1,450 r.p.m. is three quarts per hours.

Four cylinders are contained in each block, which is of built-up construction; the water jackets and valve ports are cast aluminum and the individual cylinders heat-treated steel forgings threaded into the bored holes of the aluminum castings. Each block after assembly is given a number of protective coats of enamel, both inside and out, baked on. Coats on the inside are applied under pressure.

The pistons are aluminum castings, ribbed. Connecting rods are tubular, of the forked type. One rod bears directly on the crank pin; the other rod has a bearing on the outside of the one first mentioned.

The crankshaft is of the five-bearing type, very short, stiff in design, bored for lightness and for the oiling system. The crankshaft extension is tapered for the French standard propeller hub, which is keyed and locked to the shaft. This makes possible instant change of propellers. The case is in two halves divided on the center line of the crankshaft, the bearings being fitted between the upper and lower sections. The lower half is deep, providing a large oil reservoir and stiffening the engine. The upper half is simple and provides magneto supports on extension ledges of the two main faces.

The valves are of large diameter with hollow stems, working in cast iron bushings. They are directly operated by a single hollow camshaft located over the valves. The camshafts are driven from the crankshaft by vertical shafts and bevel gears. The camshafts, cams and heads of the valve stems are all enclosed in oil-tight removable housings of cast aluminum.

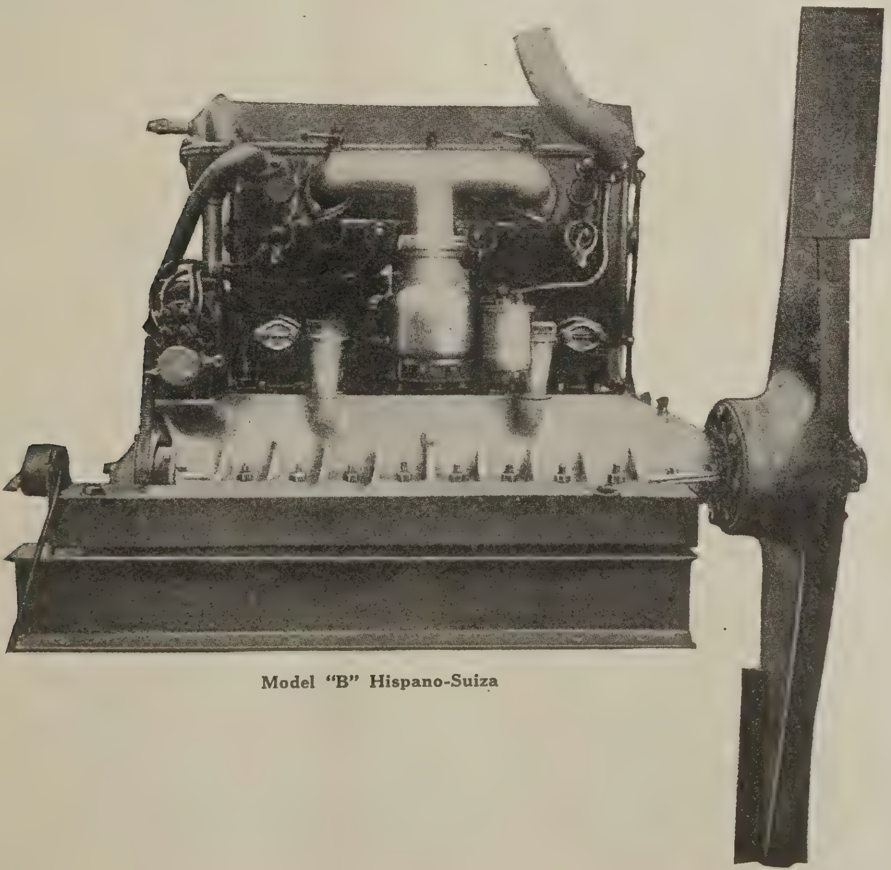
Oiling is by a positive pressure system. The oil is taken through a filter and steel tubes cast in the case to main bearings, through crankshaft to crank pins. The fourth main bearing is also provided with an oil lead from the system and through tubes running up the end of each cylinder block, oil is provided for the camshafts, cams and bearings. The surplus oil escapes through the end of the camshaft where the driving gears are mounted, and with the oil that has gathered in the top casing, descends through the drive shaft and gears to the sump.

Ignition is by two eight-cylinder magnetos firing two sparks plugs per cylinder. The magnetos are driven from each of the two vertical shafts by small bevel pinions meshing in bevel gears. The carburetor is mounted between the two cylinder blocks and feeds the two blocks through aluminum manifolds which are partly water-jacketed.

The engine can be equipped with a geared hand crank starting device.

Simplex Model "B" Hispano-Suiza

The Model B has four cylinders of the same bore and stroke as the eight, displacement 350 cubic inches. It develops 75 h.p. at 1,450 r.p.m. and can be run at higher speeds. The weight is 315 pounds. This engine is in all respects similar to the larger size, save that it has, of course, no forked connecting rods, has four-cylinder magnetos, and the water-circulating pump is differently mounted



Model "B" Hispano-Suiza

THE CURTISS FLYING CRUISER

CONTAINING every instrument and device that makes for comfort and safety, the Curtiss "Flying Cruiser" is not only one of the best equipped flying boats in the world, but is the largest and most finely finished boat flown in America. First trials were made by David H. McCulloch, chief pilot of the America Trans-Oceanic Co., at Port Washington, L. I., in the early part of November. The machine handled beautifully, and gave its owners reason to believe it would fulfill the requirements for which it was designed.

Electric starters are provided for the motors. Automatic stability is obtained by the use of the Sperry Gyroscope, operated by servo motors which are run by air fans.

A large searchlight is located at the nose of the hull. There are dash lights, cockpit lights, rear seat lights, tail lights and red and green port and starboard lights on upper wing tips. Small lights are located at the top of all interplane struts, which cast their rays downward and along all wires, making the machine quite visible at night, facilitating landing and permitting the observation of all structural members while in flight. A "trouble light" on an extensionable lead is carried in the mechanic's cockpit, for use in making adjustments or repairs.

Generators for supplying the current necessary for the operation of the gyroscopes, lights and instruments, are fastened on the outrigger where their wind turbines are near the slip stream of the propellers. Each generator is of 55-watt capacity, producing 2 amperes at 22 volts when driven at 4,000 r.p.m. To avoid the possibility of damaging the gyroscopes by an excessive current as well as to provide current for the instruments, a storage battery is placed on the circuit. The battery is of 2 ampere hours capacity. The weight of the entire electric generating installation is under 70 lbs.

The supporting surface includes the upper and lower wings, the total area of which is 853.16 sq. ft. The aeroplane (dead load) weighs 2,240.10 lbs. Power plant and accessories (dead load), 1,316.50 lbs. Live load, consisting of passenger and pilot (330 lbs.), fuel (558 lbs.), oil (62 lbs.), and the additional required load (150 lbs.) totals up to 1,100 lbs. Grand total weight of aeroplane, power plant, accessories and live load, 4,656.60 lbs.

Loading calculated at 4,656.60 (divided by 853.16), which equals 5.46 per square foot. Load lifted per rated h.p. (4,656.60 divided by 200, equals —) 23.28 lbs. per r.h.p. Load lifted per brake h.p. (4,656.60 divided by 216, equals —) 21.60 lbs. per b.h.p.

General Dimensions

Planes, upper	75′ 10″
Planes, lower	48′ 0″
Chord	7′ 0″
Gap	7′ 6″
Length overall	39′ 0″
Net weight	3,556 lbs.
Weight, fully loaded	4,656 lbs.
Motors (2) Curtiss, 100 h.p.	200 h.p.
Speed range	65-48 m.p.h.
Climb in 10 minutes	2,000′

Planes

There is no stagger nor sweepback. Upper and lower planes, excepting upper central panel, have a dihedral angle of 1 degree. Angle of incidence of wings, 4 degrees. Wing curve, modified R. A. F. 6.

Distance from leading edge to center line of front beam, 11⅜″; rear beam centered 52″ back of front beam; trailing edge 20⅝″ from center of rear beam. Chord, 7′ 0″.

Wing beams are of I section spruce. Ribs lightened, wing contour of pine with birch reining edge of spruce. Trailing edge flattened forcements. Compression ribs solid pine. Lead- ½ x ¼ steel tubing.

Covering fabric sewed to panels with seams laid diagonally. Coated with 5 coats of dope. The material is to Royal Aircraft Factory specifications.

The upper plane is in 5 sections. Center section between motor-carrying struts, has an area of 55.03 sq. ft. Total area of the other four panels, 402.60 sq. ft. Weight of upper wings without ailerons, wiring and turnbuckles, 368 lbs.

Ailerons on the upper wings are 15′ 3″ long, with a maximum width of 4 ft. Each has an area of 46.85 sq. ft. Weight, with control braces (each 32. lbs.), 64 lbs.

Above the upper plane are the "non-skid" or side-slip planes and masts, each with a surface of 12.5 sq. ft. Weight of two planes, 25.5 lbs. The masts carry the wires for overhang bracing of the upper outer wing panel.

Lower plane in 4 sections. The central sections consist of 3′ 0″ extensions or "sidewalks" projecting from either side of the hull, built into and rigidly connected to the hull. The projections are extended out far enough at either side to support the motor-carrying struts. They are covered with rubber matting and can be walked upon by the mechanician when adjustments or repairs are made about the motors.

Outer wing panels 19′ 0″ long. Overall span of lower planes, 48′ 0″. Weight of lower planes without wiring, 266 lbs. Area, 301.83 sq. ft.

Struts streamlined 4½″ x 1½″ section. The heavy motor-carrying struts are tapered, but all other struts are of constant section throughout their entire length.

Hull

Overall length of hull, 34′ 3″; maximum width (at leading edge of planes) 4′ 0″; width over fins, 8′ 0″; maximum depth, 52″; distance of step from forward perpendicular, 14′ 1″; step 6″ deep. Centerline of forward main wing beam is 20″ ahead of the step.

Planking on bottom is of 3/16″ mahogany, laid diagonally inside and running fore and aft on the outside. Frame and keel of ash. Sides below waterline, 3/16″ mahogany; 3/16″ cedar above the waterline and on top. Canvas covering on top, sides and between layers on the bottom. Weight of hull, 885 lbs., complete with seats, instrument board, etc.

Wing Floats

Wing pontoons are 7′ 0″ long, 18″ wide, 19″ deep. Displacement in fresh water by complete immersion, 800 lbs.

Frame, stringer and keel are of ash. Internal bracing No. 14 piano wire. Top and sides covered with 3 mm. Alderlite planking; bottom, 4 mm. planking. Each of the pontoons weighs 36 lbs.

Cabin

The cockpit is about 7′ 0″ long, divided into two sections. The forward section is for the two pilots, and contains the dashboard with the instruments, etc. The second section is for the two passengers, containing two lightened aluminum seats, side by side, with upholstered backs. The leather seat cushions are stuffed with buoyant Kapok.

About 4 feet back of the passenger seat is an oval opening in the deck, where the mechanician's cockpit is situated.

The instruments and accessories carried are as follows: Aneroid Barometer, graduated in feet, registering from sea level to 12,000 ft.; clock; compass, attached to and synchronized with ground drift indicator; gasoline supply gauge; air speed indicator; two oil measure gauges; angle of incidence indicator; inclinometer, (for indicating the longitudinal axis); instrument for indicating proper bank; map board; dashboard light; 2 Pyrene fire extinguishers.

The map board is hinged on the side wall so as to be let down when desired by the observer.

Throttle control is in the center of the boat, between the operators.

Controls

Standard dual Deperdussin control. Control bridge is of the inverted U type, made of ash. Control wheels are 16″ in diameter, with an enameled aluminum spider and black walnut rim. All sheaves for guiding control cables are made of bronze.

Total movement of an aileron is 60 degrees, (30 degrees upward and 30 degrees downward). This movement is produced by 1¼ turns of the control wheel. Aileron cables flexible, 5/32″ diameter.

Total movement of the rudder is 60 degrees, the corresponding movement of the rudder bars being 45 degrees to the longitudinal axis of the hull. Foot bars made of ash. A ribbed bronze casting supports the foot bars.

Weight of control wires, 32 lbs.

Tail Group

Stabilizing plane is 16′ across at the rear end; 6′ 3″ in chord. Area 63.9 sq. ft. It is non-lifting, being in neutral position when machine is horizontal. It is located at the level of the centre of propeller thrust. An outrigger, 4″ in diameter, runs from the center of the rear central interplane strut to leading edge of tail plane. Outrigger weighs 25 lbs. Two streamlined supports are provided at either side of the tail group, running up from the hull.

Tail plane weighs 61 lbs., and the braces weigh 23 lbs.

Vertical fin has an area of 34.9 sq. ft. Its weight is 31 lbs.

Elevators have each an area of 24.9 sq. ft., and each weighs 15.5 lbs. Distance from tip to tip of the elevators, 18′ 0″. Two pairs of forged steel control levers or braces are provided on each elevator.

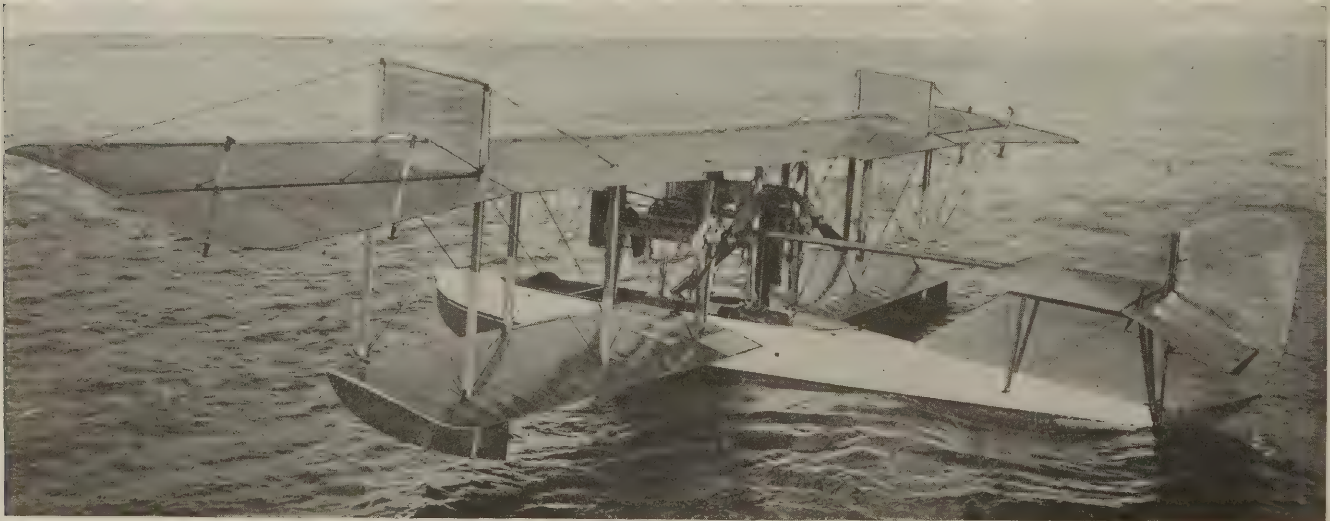
Rudder area 31.2 sq. ft.; weight, including control braces, 27 lbs. Maximum width, 4′ 3″; height above bottom of hull, 8′ 9″. Rudder control braces located 12″ above tail plane, and 24″ below tail plane.

Motor Group

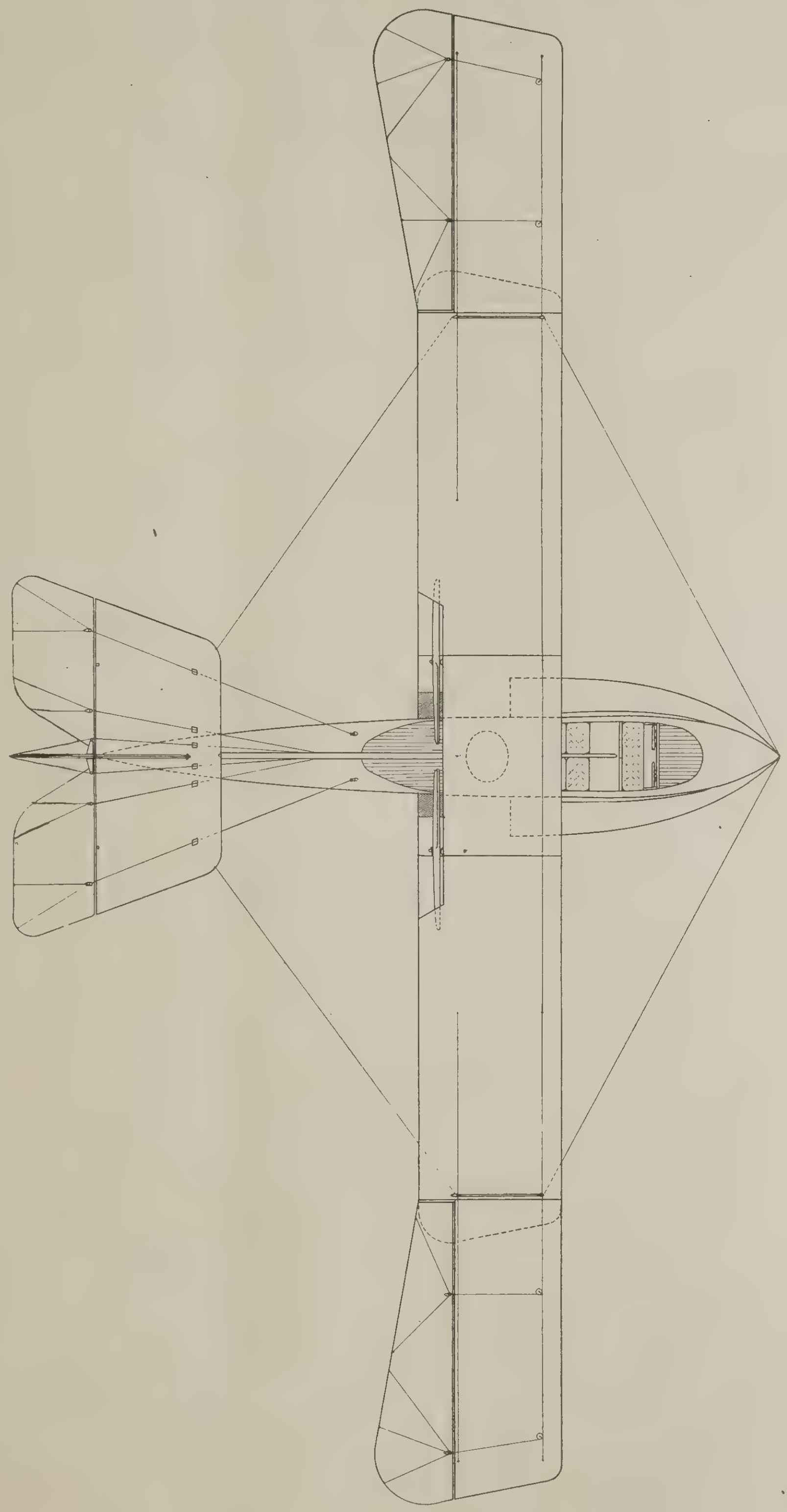
Two 100 H.P. motors, Curtiss OXX 2 type, are spaced 8′ 6″ part. Each motor weighs 412 lbs. Propellers 8′ 3″ in diameter, rotated in opposite directions. An electric self-starter is provided for each motor, the shaft of which engages with, and is disconnectable from, a gear 18″ in diameter to which the propeller hub is attached.

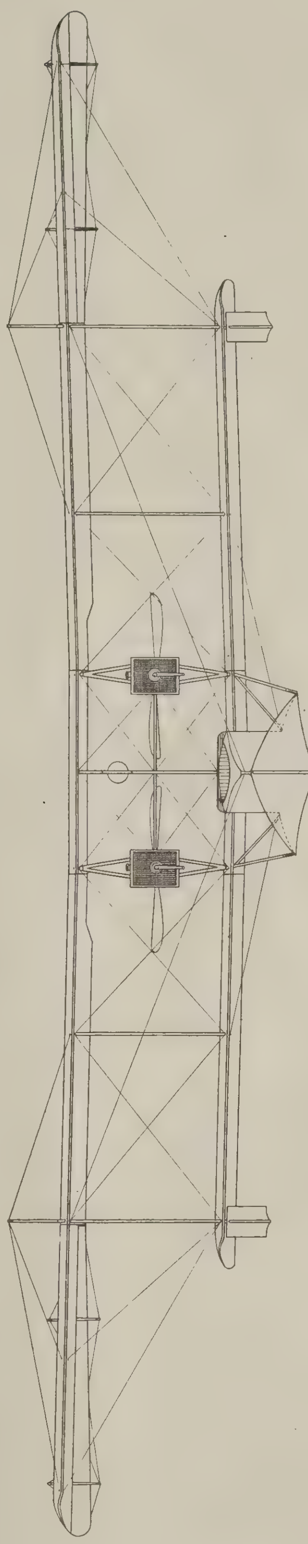
Radiators 3½″ thick, with a face measuring 29″ x 22″, held by brackets to the motor struts, and 3″ forward of the struts. A 14″ crank is attached to the shaft which projects through a circular hole opening in the radiator, for starting the motors by hand. 80 lbs. of water are carried. Each radiator weighs 70 lbs.

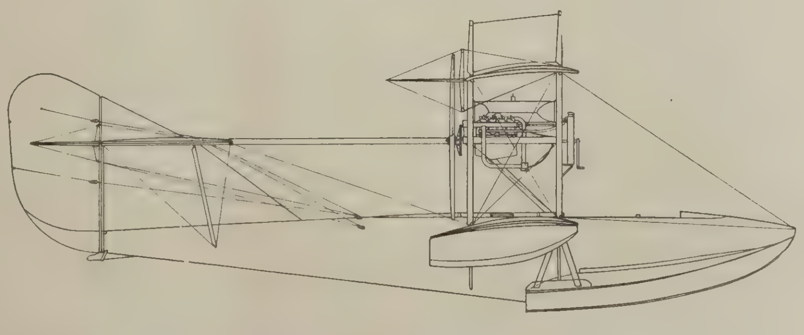
Fuel capacity 90 gallons, sufficient for a 5 hour flight with motors running at their rated horsepower.



The Five-Passenger Curtiss Cruiser of the America Trans-Oceanic Co., at Port Washington, L. I.







THE CURTISS
SUPER-AMERICA TYPE
FLYING CRUISER

Scale of Feet

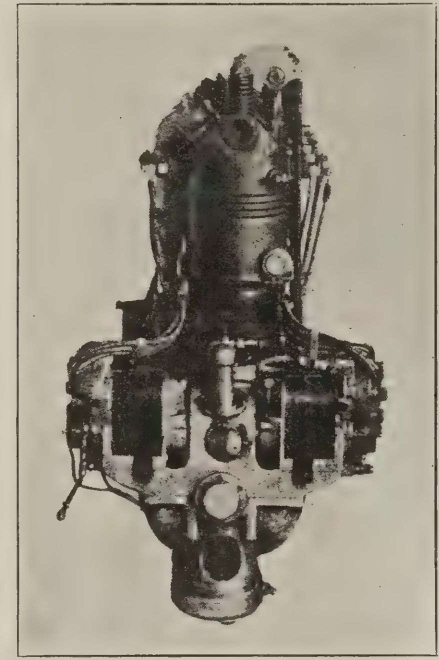
McLaughlin

THE 160 H.P. BENZ AERO ENGINE

WE publish herewith a description of the German Benz 160 h.p. aviation engine, through the courtesy of our English contemporary, *The Automobile Engineer,* which has been given special facilities by the Naval and Military authorities for securing the details.

The engine forming the subject of the ensuing notes is the six-cylinder 160 h.p. Benz, and is, of course, designed for a different purpose from the 200 h. p. Maybach described in the December issue of *The Automobile Engineer,* inasmuch as the Benz is evidently entirely a production for use in aeroplanes. The bore and stroke are 130 mm. and 180 mm. respectively, and the general exterior design is excellent, although in certain directions, that we are precluded from discussing here, the engine does not compare favorably with the best aeroplane engines of Allied manufacture. However, in so far as general neatness and careful arranging are concerned, the Benz is extremely commendable. It will be noticed that the engine is of very compact outline, with water piping at a minimum, and that altogether it is of as good streamline form as is practically possible. In the detail design, disposition of the accessories, etc., the engine is equally good.

From the side view of the engine it will be seen that the interconnected throttles of the two carburetors are incorporated in the crank case casting, the two float chambers bolting to the side of the crank case just beneath. From the top face of the crank case the induction pipe branches run compactly against the cylinder to the inlet ports. Between the two induction branches the water inlet to the cylinder jackets will be noticed, and in connection with details of the water circulation generally it may be mentioned that this short pipe is practically all the water piping on the engine. From the off-side view of the engine it will be seen that water connections between the cylinders are made by face joints, both the inlet water pipe and the outlet water pipe being practically integral with the cylinders, each section of the pipe making a butt joint with its neighbor as follows: A rubber ring interposed between each pair of cylinders is compressed between the faces of the waterways, so making the joint. The same method is adopted for the top water pipes, so that a neat and compact arrangement results; the waterway from the pump is cast in the crank case.

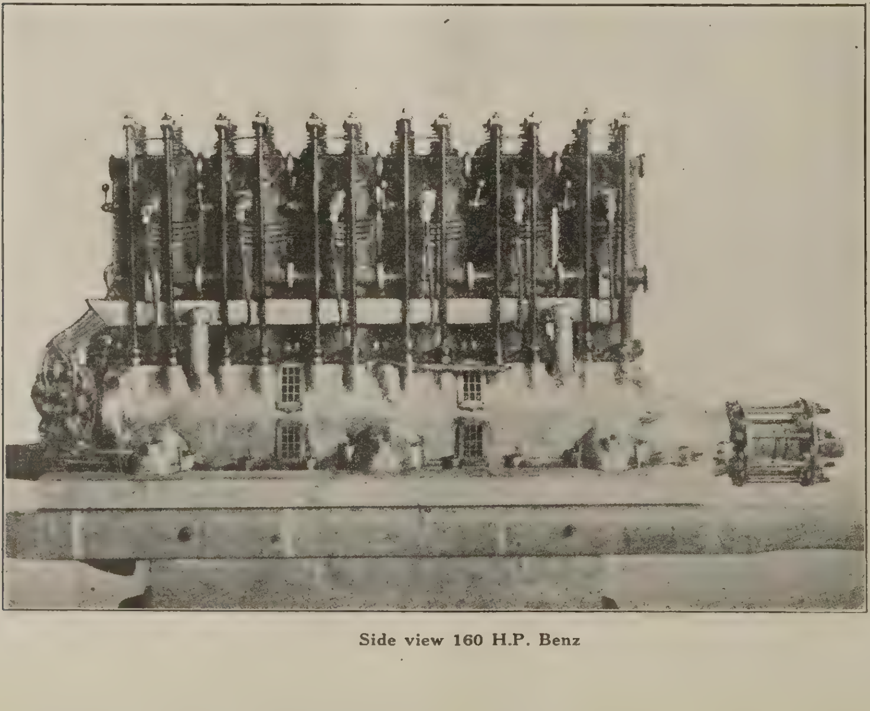


End view 160 H.P. Benz

The rear end view of the engine shows the neatness and compactness with which the two magnetos have been mounted; the sturdy box section brackets on which they rest will be noticed.

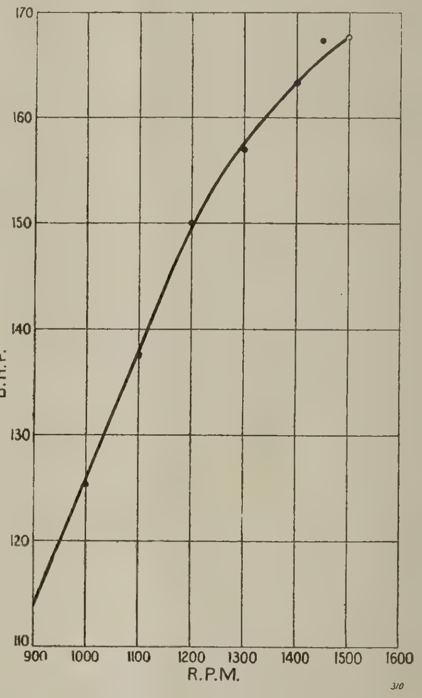
All things considered, the general layout of the engine presents many pleasing features that designers will appreciate, although, of course, it is by no means suggested that such ingenuity in design necessarily implies that the engine is either correct in other and more theoretical considerations, or even that it is necessarily reliable. It may be, or it may not, but the exterior appearance is certainly good.

With regard to the detail construction of the engine, the cylinders, it will be seen, are separate. They are of cast iron, with pressed steel water jackets welded on. The crank case, of course, is of aluminum, and all the valves and accessory driving gear have been arranged at the rear end of the engine, with the evident object of keeping the front end clear for the fixing of the propeller hub. The camshaft is on the off side of the crank case, and operates the valves through the usual pusher rods. The valve rocking levers are built up from plate, two strips of mild steel sheet about 3 mm. in thickness being employed. The fulcrums for the valve rocking levers are arranged at the ends of rods with bosses for this purpose on the top. These rods are screwed into the cylinder heads, and they are fitted with ball bearings. The valve pressers themselves are hollow, having a wall about 1½ mm. thickness, and the bottom of the hollow has a small radial cavity in which the ball end of the valve pusher rod itself rests. The valve rod carries at its lower end an inverted cup that caps the pusher guide to throw back any oil escaping from the valve rod pusher. The adjustment is extremely simple, and consists of a ball-ended screw locked in the split boss of the overhead rocking lever by a nut. This screw is further locked and clamped by a small set screw passing through the split boss.



Side view 160 H.P. Benz

The driving arrangement for the crankshaft and accessories is interesting. On the crankshaft next to the end web is a pinion driving the camshaft and gear. This pinion drives also a wheel directly above it, which is integral with a short spindle that carries the large bevel for the magneto drive, and the small bevel for the revolution counter. Solid with this spindle is a cam that operates the air pump, and the wheel driving this spindle also drives the camshaft. On the end of the camshaft a further small bevel is fitted that drives the water pump, and the oil pump is skew gear driven off the camshaft. The general arrangement drawing that shows the scheme of the accessory driving gear also shows very clearly the arrangement of the water pump and the manner in which it delivers to the integrally cast water pipe in the crank case casting. The off side view of the engine, showing the high-tension wire carrier, valve pusher rods, etc., shows also the two breathers arranged on the side of the crank case, and also the air inlet ports to the two carburetors. The air supply to the carburetors is so arranged that it is drawn through the crank case, cooling and scavenging this, and at the same time warming the air. It will be noticed from the end view of the engine that there is a further breather arranged on the crank case between the two magnetos. It is evidently the practice of the Benz Co. to make all the cylinders alike, because it will be seen that the end cylinders have the usual waterways, but these are blanked off. Where the water outlets occur conveniently on the near side of the engine they are used, incidentally, to hold up the wire carrier on that side of the engine, there being, of course, one on each side, dual ignition being employed. A half compression device is incorporated in the crank case, although this is not very clearly shown in any of the illustrations.



Power curve of the 160 h.p. Benz engine.

The crankshaft is hollow, and it is interesting to note that, where it has been necessary to plug this, solder has been used, even quite large holes being plugged with this material. Each journal and pin has a $\frac{3}{16}$-in. hole drilled through the solder plug to allow oil to escape for the lubrication of the camshaft, cylinders, etc.

With regard to lubrication, the details available at the moment are somewhat meagre, but it is believed that the system is of a dual type. With one system in use the oil is circulated to the various parts of the engine in the usual manner. In the event of this failing, however, it was arranged that fresh oil could be supplied to the bearings, so that if one failed the supply from the other could be relied upon. The two systems are, we believe, quite independent. A gear pump running at engine speed is used in connection with the pressure system, and a double plunger pump in connection with the other system. It is hoped that fuller particulars may be furnished later.

The pistons are fitted with three rings, and the gudgeon pin is located in each cylinder in the usual manner. The pistons are of cast iron, and, as no special effort has been made to produce this engine for particularly high speeds, cast iron was doubtless satisfactory, and, moreover, the shortage of aluminum in Germany is well **known.**

The following are a few figures in connection with the engine:

Maximum h.p., 167.5 b.h.p.

Speed at maximum h.p., 1,500 r.p.m.

Piston speed at maximum h.p., 1,770 ft. per min.

Normal h.p., 160 b.h.p.

Speed at normal h.p., 1,400 r.p.m.

Piston speed at normal h.p., 1,656 ft. per min.

Brake mean pressure at maximum h.p., 101.2 lb. per sq. in.

Brake mean pressure at normal h.p., 103.4 lb. per sq. in.

Specific power cu. in. swept volume per b.h.p., 5.46 cu. in.; 160 b.h.p.

Weight of piston, complete with gudgeon pin, rings, etc., 5.0 lb.

Weight of connecting rod, complete with bearings, 4.99 lb.; 1.8 lb. reciprocating.

Weight of reciprocating parts per cylinder, 6.8 lb.

Weight of reciprocating parts per sq. in. of piston area, 0.33 lb.

Outside diameter of inlet valve, 68 mm.; 2.68 in.

Diameter of inlet valve port (*d*), 61.5 mm.; 2.42 in.

Maximum lift of inlet valve (*h*), 11 mm.; 0.443 in.

Area of inlet valve opening ($\pi d h$), 21.25 sq. cm.; 3.29 sq. in.

Inlet valve opens, deg. on crank, top dead centre.

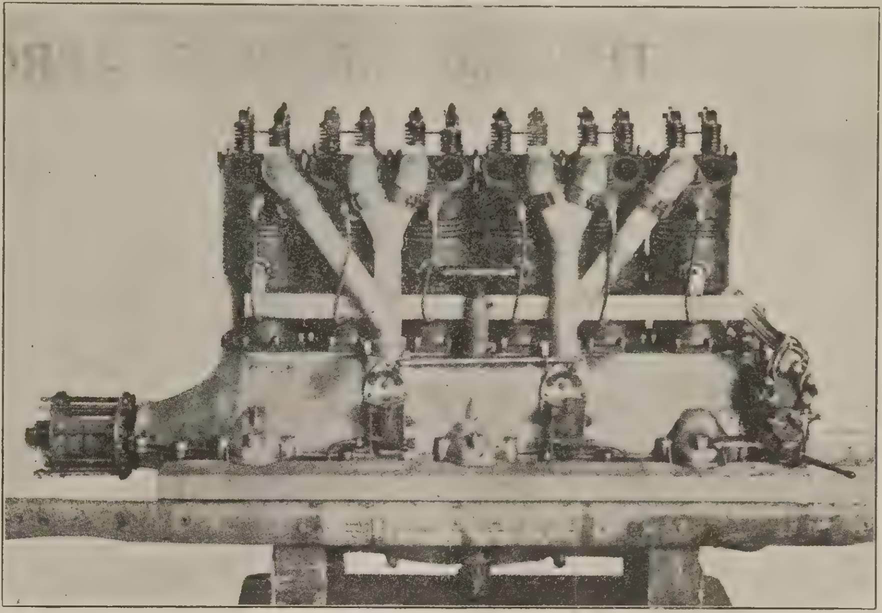
Inlet valve closes, deg. on crank, 60° late; 35 mm. late.

Outside diameter of exhaust valve, 68 mm.; 2.68 in.

Diameter of exhaust valve port (*d*), 61.5 mm.; 2.42 in.

Maximum lift of exhaust valve (*h*) 11 mm.; 0.433 in.

Area of exhaust valve opening ($\pi d h$), 21.25 sq. cm.; 3.29 sq. in.



Side view 160 H.P. Benz

Exhaust valve opens, degrees on crank, 60° early; 35 mm. early.

Exhaust valve closes, degrees on crank, 16½° late; 5 mm. late.

Length of connecting rod between centres, 314 mm.; 12.36 in.

Ratio, connecting rod to crank throw, 3.49:1.

Diameter of crankshaft, 56 mm. outside, 2.165 in.; 28 mm. inside, 1.102 in.

Diameter of crank pin, 55 mm. outside, 2.165 in.; 28 mm. inside, 1.102 in.

Diameter of gudgeon pin, 30 mm. outside, 1.181 in.; 19 mm. inside, 0.748 in.

Diameter of camshaft, 26 mm. outside, 1.023 in.; 18 mm. inside, 0.708 in.

No. of crankshaft bearings, 7.

Projected area of crank pin bearing, 36.85 sq. cm.; 5.72 sq. in.

Projected area of gudgeon pin bearing, 22.20 sq. cm.; 3.44 sq. in.

Firing sequence, 1, 5, 3, 6, 2, 4.

Type of magnetos, ZH6 Bosch.

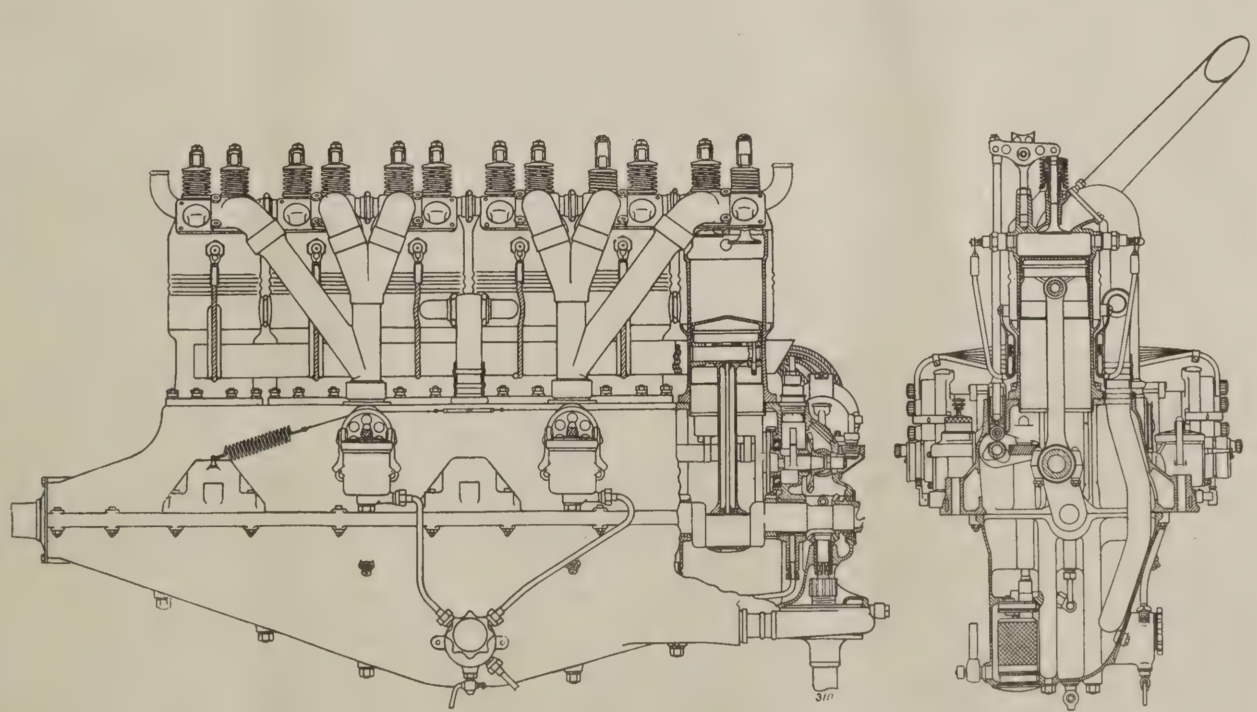
Direction of rotation of magneto from driving end, one clock, one anti-clock.

Magneto timing, full advance, 30° early (16 mm. early).

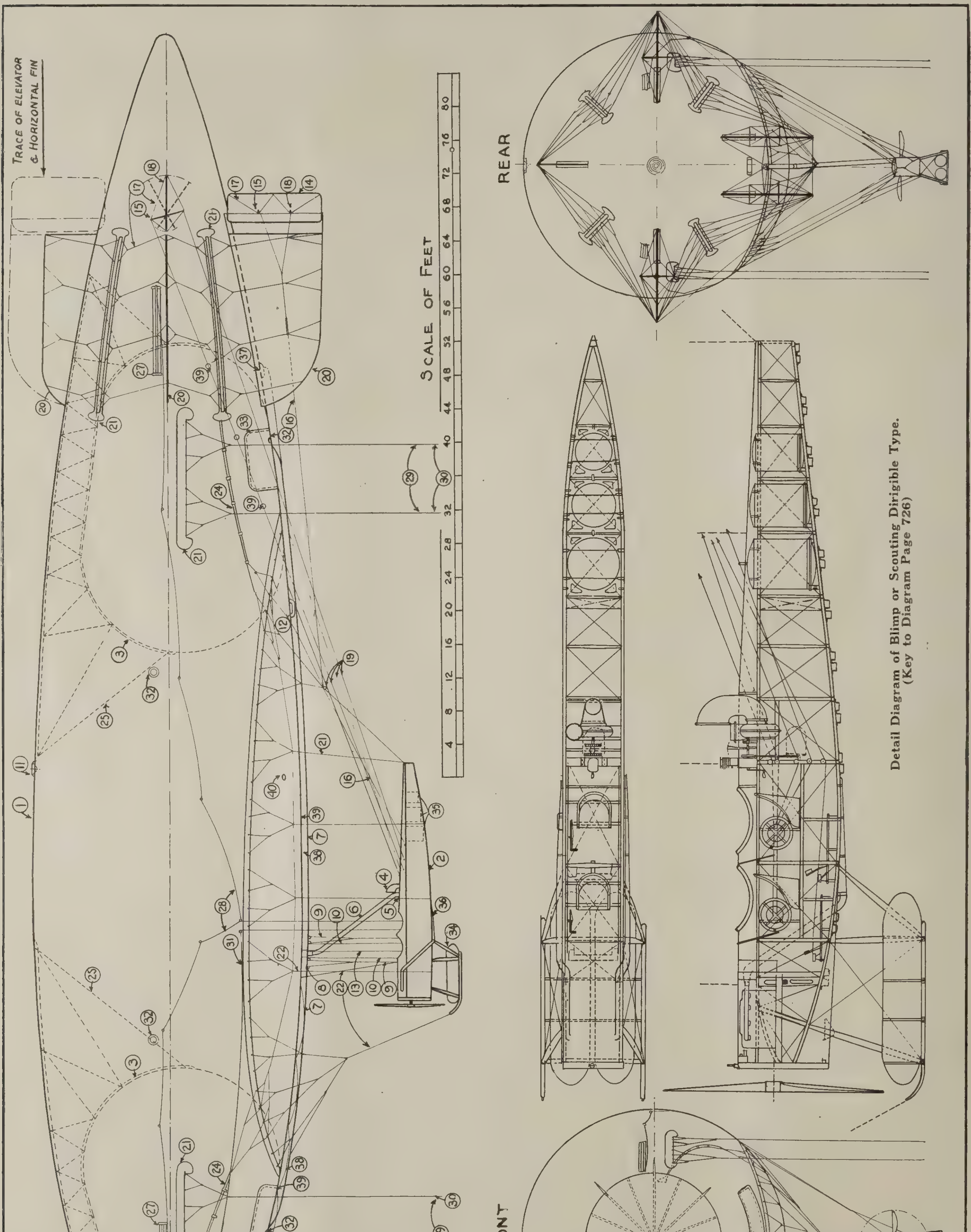
Type of carburetors, (2) Benz design.

Fuel consumption per hour, normal h.p., 0.57 pint.

Normal speed of propeller, engine speed, 1,400 r.p.m.



GENERAL ARRANGEMENT OF BENZ AERO ENGINE.



Detail Diagram of Blimp or Scouting Dirigible Type.
(Key to Diagram Page 726)

SPECIFICATIONS FOR NAVY DIRIGIBLES

A closer view of one of the Blimps.

SPECIFICATIONS have been issued by the Navy Department, and prices asked on one, two, four and eight dirigibles, and an equivalent number of power plants, to be delivered at any point to be designated by the Government on the Atlantic or Gulf coasts of the United States. Final acceptance tests to be completed within 120 days after date of contract or bureau order. The department states that alternate bids with a greater time for delivery and completion of tests may be submitted and will be considered, but the right is reserved to make award on time stated above.

The bids are to be opened at 10 a. m. on March 6th.

The complete specifications follow:

SPECIFICATIONS.

(SPECIAL CONDITIONS WHICH MODIFY FORM A.)

The following specifications, terms and special conditions are understood to apply to each dirigible contracted for.

The department having adopted, as foundation for this contract, the plans and specifications herein below guaranteed by the contractor to be capable of certain performances, assumes no responsibility with reference thereto, and will consider any changes therein suggested by the contractor, and will feel it to be its duty to permit changes therein so long as the requirements of the contract, plans and specifications remain substantially the same. The contractor shall submit from time to time as required the detailed drawings, plans, and specifications of the vessel for the examination and approval of the department, and all drawings shall have the approval of the department before the work is begun, but the department shall not be held responsible for any failure of the vessel to fulfill any of the contract requirements unless such failure be due to the adoption and use of any design or material not specifically covered by the specifications and made on the request or demand of the department for which the contractor disclaims responsibility at the time of such demand or request by the department. The permission of the department to make changes suggested by the contractor shall not place the responsibility therefor upon the department.

The contractor will, at his own risk and expense, construct, in accordance with the aforesaid drawings, plans, and specifications, including duly authorized changes therein, one dirigible, to be provided with fittings, equipment, machinery, devices, appliances, and appurtenances complete in all respects, and in acordance with detailed plans and specifications to be prepared in accordance with the aforesaid drawings, plans, specifications, and current practice at date such drawings are submitted for approval by the contractor and submitted to the department for its examination and approval from time to time, as may be necessary, before the work is begun.

The prices quoted above are not to include transportation charges from the contractor's works to point of delivery. When the destination of each dirigible is determined, the contract price will be modified to include the transportation charges.

Guarantee.—The contractors must agree to guarantee the dirigible for three (3) months from date of delivery. Any defects which may develop within that time which can be attributed to faulty workmanship, material, or design must be made good by the contractors without cost to the Government.

The contractors shall guarantee to protect the Government against any patent infringement; the Government also having the right to use with the dirigible any and all of the patented features controlled by the manufacturer of the dirigible without any obligation on the part of the Government.

Payments.—Payments shall be made by the department upon bills submitted in quadruplicate and certified by the inspectors of the department in such form as the department may direct, as follows:

Fifty per cent of the contract price of the dirigible when—

(*a*) The envelope and ballonets have been satisfactorily air tested.

(*b*) All parts have been satisfactorily assembled at the works of the contractors.

(*c*) All parts have been satisfactorily tested at the works of the contractors.

(*d*) The complete dirigible has been prepared and placed on board for shipment to destination and transportation company's receipt delivered to the inspector.

Forty per cent of the contract price when the dirigible has been accepted.

Ten per cent of the contract price or such part thereof as may remain at the expiration of three months as is due the contractors after remedying by the Government of such defects as they may be responsible for.

The contractor agrees to refund to the Government one-half of the payment of 50 per cent of the contract price above referred to, in case a dirigible after trial shall be rejected.

The bond on the contract will, therefore, be 50 per cent of the contract price, the liability being limited to 25 per cent of the contract price for satisfactory performance of the contract, and 25 per cent of the contract price for refund of the amount specified above.

Insurance.—The dirigible, after being delivered to the transportation company, shall be insured by the contractors at their expense in such form as the Secretary of the Navy may designate, against risks of transportation, fire, and damage; except such damage as may occur during actual trials free from the ground.

Bonus and penalty.—The dirigible is desired to be ready for its trials within three months from date of contract. If the dirigible satisfactorily completes its acceptance trials before the expiration of four months, a bonus of $100 a day will be paid for each day so saved up to 30 days. Liquidated damages at the rate of $100 per day will accrue for each day beyond the four months period until the ship is given satisfactory trials, subject to remission for any of the causes stated in paragraph 10 of the conditions of Form A.

No extension of time hereinabove allowed for completion shall operate to extend the premium period fixed above, except such extensions as are approved by the department to correspond to delays in trials or delivery, when it shall appear that after the vessel has been practically completed and made ready for trials, the carrying out of the trials and delivery is prevented or delayed due to unsuitable weather conditions, failure of the department to provide a trial board promptly, or other causes for which the contractor is not responsible.

The total bare weight shall not exceed the figure given in the weight statement marked "Penalty weight," and any overweight shall render the ship liable to rejection. A bonus of $5 per pound will be paid for each pound of weight as listed above which the contractor can show has been saved. Items of outfit or equipment, such as instruments, fire extinguishers, etc., which may be added or omitted at the department's request shall not be counted in computing the bonus earned. Furthermore, if the department should later decide that any fin, tank, or other feature of the design is unnecessary, the weight saved by its omission shall be substracted from the "penalty weight" above before bonus is computed.

Uncompleted work.—The dirigible when delivered to the Government must be as nearly complete in accordance with the contract as possible, but should there be any work not completed by the contractors it will be done by the Government at the contractors' expense.

Inspection.—The work of construction shall be at all times open to inspectors of the department and their assistants, and every facility shall be afforded such inspectors for the prosecution of their work.

Inspectors may peremptorily reject any inferior workmanship or material or forbid the use thereof. Should the contractors question such decision, they shall have the right of appeal to the department, whose decision shall be final.

The contractors shall furnish under the contract, without additional cost, such samples of material and information as to the quality thereof and manner of using same as may be required, together with any assistance necessary in testing or handling materials for the purpose of inspection or test.

Suitable offices, conveniences, and necessities for the use of the inspector or his assistants during the construction of the dirigible shall be furnished under the contract.

Correspondence.—All correspondence with the department shall be forwarded through the inspector in duplicate. Letters involving claims for delay and appeals to the department shall be forwarded through the inspector in triplicate.

Weighing of material.—The contractors shall furnish under the contract competent weighmasters, who shall make daily returns of weights to the inspector in such manner as the inspector may prescribe.

The contractors shall furnish the necessary scales and other apparatus for making correct return of weights. Great care shall be taken that all scales are properly adjusted and that no estimated or calculated weights are returned.

All material of every description placed on or attached to the dirigible shall be weighed, together with all material of every description which after being weighed and placed on or attached to the dirigible are removed; the weight and description of the part weighed in all cases to be reported to the inspector.

Where material is assembled before being weighed the center of gravity of such assembly shall be ascertained. The center of gravity of each part or group of parts entering into or attached to the dirigible shall be reported in relation to the nose of the dirigible and from the axis of the envelope.

Trials.—The acceptance trials shall be conducted by the contractor, who shall furnish all necessary gas, fuel, or other material and the operating personnel. The contractor may select good weather for the trials in which the wind velocity at a height of 100 feet from the ground is less than 15 miles per hour. The department expects to have ready sheds for housing the dirigible at the point of delivery and it is agreed that the contractor shall have the use of such shed from which to conduct the trials. In case trials are held from a Government shed, the Government agrees to provide hydrogen gas at a cost to the contractor of 1 cent per cubic foot, and also labor for handling the dirigible on the ground under the supervision of the contractor.

The contractor may conduct the acceptance trials at a place selected by him, furnishing his own gas, labor, shed, and all facilities. When trials are completed the dirigible is to be crated and prepared for shipment to destination, where it shall be erected and inflated by the Government under the supervision of the contractor.

The following trials shall be conducted, the procedure to be followed to be settled by agreement before such trials are undertaken:

(*a*) *Endurance trial.*—With full load at start consisting of the bare weight listed in the weight statement and a useful load of 2 men, full supply of fuel and oil and such ballast as the contractor may choose to carry, the ship is to be driven through the air continuously at full power for three hours.

(*b*) *Speed trial.*—With any convenient load the ship is to be driven at a full speed through the air over a measured course at least 10 miles in length.

(*c*) *Maneuvering trial.*—With any convenient load, the ship is to ascend to a height of 6,000 feet in 10 minutes, to descend from this height in 15 minutes, and to be so maneuvered as to demonstrate that she is completely under control in three dimensions both at full speed and at cruising speed.

The dirigible shall, in addition, fulfill on said trials the following conditions:

(1) The working of all the machinery, devices, appliances, and appurtenances, and all parts thereof, shall be to the satisfaction of the department.

(2) The dirigible shall be found in all its parts to be strong and well built and in strict conformity with the contract, drawings, plans and specifications, and duly authorized changes therein. During the time of these trials and thereafter until delivery of the dirigible all machinery and equipment shall be kept in an efficient and operating condition by the contractor.

If, upon the trials and tests required by this contract, the dirigible shall fail to fulfill the requirements and conditions hereof, the contractor shall be entitled to make further trials, sufficient in number to demonstrate its capabilities: *Provided,* That the number of trials shall be determined and limited by the department and that all the expenses of all trials and tests of the dirigible prior to conditional acceptance shall be borne by the contractor.

Such tests and trials shall be witnessed and reported upon by a board appointed by the department in order to determine whether or not the dirigible as completed satisfies the requirements. The board shall have power to prescribe the precautions and methods necessary to insure accurate results, but shall have no power to direct the methods of operation of the dirigible on trial, and the board shall take into account and report upon the performance of the dirigible and her qualifications and capabilities with respect to the demonstration by tests and trials, as aforesaid, of special features not specifically covered in the tests and trials prescribed. If, at and upon the trials and tests before mentioned, the foregoing requirements and conditions shall be fulfilled, and if the dirigible is built in accordance with the requirements of the contract, plans, and specifications, and duly authorized changes, and is complete in every respect and ready for delivery to the department, then, and in such case, the dirigible shall be conditionally accepted; but if the speed and other qualities attained by the dirigible on trial shall fall below the guaranties and requirements aforesaid, but not below certain minimum requirements hereinafter set forth, deductions from the price shall be made in accordance with the following provisions, viz:

Every effort shall be made to attain the designed speed of 45 miles per hour, but if the speed on trial is below 35 miles per hour the dirigible may be rejected.

Accounts.—During the construction of the dirigible detail cost accounts shall be kept and such accounts, in condensed form, shall be submitted to the department upon completion of the contract. These accounts shall be at all times open to the inspection of the department's representatives. It is agreed by the department that all cost data supplied by the contractor is to be considered strictly confidential.

THE CONSTRUCTION OF A NONRIGID NAVAL DIRIGIBLE FOR COAST PATROL

This specification contemplates a nonrigid self-propelled dirigible or airship designed for use in connection with coast or harbor patrol. It is intended that the dirigible shall be operated from a base on shore, but that it shall be possible for it to rest upon the surface of the water in good weather.

The airship shall consist of a non-rigid envelope made of rubberized fabric and containing hydrogen under sufficient pressure to maintain the rigidity of the envelope. There shall be attached to the envelope vertical or horizontal fins and vertical and horizontal rudders, mooring line, rip panels, maneuvering and safety valves, ballonets or internal air sacks with means for their inflation.

Beneath the envelope and supported thereby is carried upon a suspension a car or body containing the power plant, fuel, ballast, personnel, radio, etc.

The envelope fully inflated has a displacement of about 77,000 cubic feet, corresponding to a gross buoyancy of 5,275 pounds when inflated with hydrogen of good commercial purity and under normal conditions of barometer and temperature. Under these conditions the lift is reckoned at 0.068 pound per cubic foot, at 15° C. and 760 mm.

The length of the envelope is 160 feet and the maximum diameter 31.5 feet; maximum width over tail fins, 36.2 feet; the center of buoyancy is 69.2 feet from the nose; the height over all is 50 feet; horsepower of motor, 100; horsepower of blower engine, 2; maximum safe altitude, 7,500 feet.

Designed maximum speed at an altitude of 600 feet, 45 miles per hour; endurance at full power, 10 hours; cruising speed, 35 miles per hour; endurance at cruising speed, 16 hours.

Capacity of tanks, 100 gallons, 600 pounds.

Total volume of both ballonets, 19,250 cubic feet.

Reserve ballast tank in car, 300 pounds of water.

Trimming tanks attached to envelope: Forward, 40 pounds of water; after, 50 pounds of water.

The following weight statement is furnished for the guidance of the contractors and is subject to such changes in distribution as are found necessary during development, but the total weight of all items is not to be exceeded:

Envelope (including seams, nose piece, and doublings only for ballonet attachment, tail group, grab ropes, and ballonet suspension, also belly band)	1,177
Gas valves and sight holes	36
Air ducts, air valves, and air manifold	54
Suspension, wire cable, crow's feet, grab ropes	35
Ballonets, including ballonet suspension	350
Fins and rudders, including their bracing	480
Running rigging for steering and rip panels, and parts of nose rope on envelope	43
Car:	
Structure (including tank weights)	321
Engine, mufflers, radiator and water, propeller and hub	568
Blower engine and blower	100
Starting crank for main engine	25
Lighting cells, wiring and lamps	30
Landing gear and floats	58
Miscellaneous fittings, including jack stay, stirrups, and nose rope	57
Total "penalty weight"	3,334
Useful load:	
Pilot and observer	320
Instruments	100
Radio	250
Fuel and oil	670
Water ballast (including 90 pounds for trimming)	390
Sandbag ballast	211
	1,941

The following plans are furnished as a part of these specifications. In case of any discrepancy between the plans and specifications, however, the specifications shall prevail.

(1) General arrangement plan.

(2) Detail sheet showing type construction of miscellaneous parts.

The contractors shall develop from the plans and specifications such working plans as may be necessary for the construction of the dirigible. Before undertaking work or ordering material from such plans the plans must first receive the approval of the inspector, and all work done on the dirigible must be strictly in accordance with such approved plans.

The inspector shall be furnished with a copy of all requisitions for material. In case it is desired that such material shall be inspected at the place of manufacture, the inspector shall be so advised at the time of placing the order and furnished with such additional copies of the requisition as he may require. Should it not be convenient to inspect the material at the place of manufacture, the contractors will be so advised and the material will be inspected after delivery at the contractors' works.

Within one month after the delivery of the dirigible the inspector shall be furnished with complete plans, in the form of cloth tracings in ink with blue prints in triplicate, of all parts of the dirigible, corrected to show the work as it was actually installed at the time of delivery.

Parts which are partially or completely assembled before installation shall be photographed and two (2) prints from a negative (6 by 8 inches) shall be supplied the inspector. The object of this requirement is to obtain photographs of fin and rudder construction, valves, suspension car, blower installation, power-plant installation, etc., to form a record of progress. With the final plans the contractor shall deliver to the inspector 12 copies of a descriptive booklet giving complete description of material, construction, operation, testing, care, and maintenance of the completed dirigible and each of its principal parts and accessories.

Workmanship.—The workmanship throughout shall be of the most thorough character and suitable for the purpose intended and satisfactory to the inspector.

Aluminum shall not be used for important strength members, nor shall any strength member depend for its strength upon brazing, welding or soldering.

ARTICLES OF EQUIPMENT AND OUTFIT TO BE FURNISHED AND INSTALLED BY THE CONTRACTORS UNDER THE CONTRACT

Tachometer.
Gasoline air pressure gauge.
Circulating water and lubricating oil thermometers.
Oil pressure gauge.
Longitudinal inclinometer.
Map boards.
Mooring rope.
Two gas pressure manometers.
One ballonet air pressure manometer.

ARTICLES OF EQUIPMENT AND OUTFIT TO BE FURNISHED BY THE GOVERNMENT AND INSTALLED BY THE CONTRACTORS UNDER THE CONTRACT

Altimeter, statoscope, compass, air speed meter, fire extinguisher (chemical sprinkler type). Search light.

Protective coatings.—The envelope shall be made of rubberized fabric with a protective coating. The car shall have woodwork sandpapered and coated with heavy spar varnish, "Valspar" or its equivalent in quality. Wire cable shall be galvanized and solid wire used in the body construction shall be tinned. Steel bolts and pins shall be coppered and nickel plated. Clips of sheet steel shall be hot galvanized or coppered and nickel plated or copper plated and covered with baked enamel.

The fabric covering the car, fins and rudders, shall be coated with at least five (5) applications of nitrocellulose, and finally coated with "Valspar" varnish or its equivalent.

Portable canvas coverings for cockpits and power plant shall be furnished.

FABRIC REQUIREMENTS

Factor of safety.—The contractor must be able to show that the fabric factor of safety under normal running conditions for any part of the dirigible exceeds 8. The strength to be taken as a basis, to be found by the methods given below.

Construction of fabric.—All fabric used in the envelope or ballonets to contain two or more plies of cloth, one of which is to be laid on a a bias of 45 degrees. Sufficient rubber of proper quality shall be placed in the fabric to meet the requirements as to diffusion and weather-resisting properties, which are given below. The protective coating on the outside of the envelope shall weigh at least 0.4 ounce per square yard, and on the inside 0.2 ounce per square yard.

No fabric in the balloon is to weigh over 12 ounces per square yard, and no fabric is to test less than 40 pounds per inch in the direction of any of the threads, either bias or straight, test to be made as described below.

Fabric in the top of the balloon shall show an average strength over 60 pounds per inch for the four different directions of threads; or a strength over 100 pounds per inch in either warp or filler if the two plies are doubled straight together for a sample test.

The fabric which is intended to separate air and gas shall have an average hydrogen diffusion not greater than nine liters per square meter per 24 hours, according to the procedure given below, and under a pressure of 30 millimeters of water.

Samples of the finished fabric shall be submitted to the naval inspector for approval before starting construction.

Method of weight testing.—The figure for the weight of fabric shall be obtained by getting the net weight of an entire roll and dividing by its superficial area in square yards.

Strength test.—Dimensions of samples, 2 inches wide by 6 inches long. Cut 12 samples from each roll, including 3 each from the warp and filling of the straight ply, and 3 each from the warp and filling of the bias ply. Place in the testing machine with 3 inches initial gap between jaws. The speed of separation of jaws will be 12 inches per minute. Use jaws 2 inches wide. A number of specimen seams shall also be tested by this method, enough to prove to the inspector that they are over 100 per cent efficient.

Diffusion.—The following conditions are assumed when getting the final result for hydrogen diffusion:

1. Temperature 15° C.
2. Pressure on the air side of fabric to be atmospheric with pressure difference of 30 millimetres of water.
3. Current of air to be maintained on the air side.
4. Fabric to "soak" in the hydrogen for at least 5 hours before starting test.
5. Run the test itself at least 2 hours and correct the result to apply to 24-hour period.
6. Keep the air stream perfectly uniform (about 5 bubbles per second through sulphuric acid).
7. Apparatus and method to be the same in principle as that used by the Goodyear Tire & Rubber Co., described by R. A. D. Preston in *India Rubber World,* November 1, 1914, page 70, in which a constant pressure of hydrogen is maintained on one side of a test piece of fabric, while air is passed over the other side, taking with it the hydrogen which diffuses through the fabric, which hydrogen is burned to water and weighed.

Instead of running the test at 15° C., which is the standard, it may be run at any fixed temperature up to 20° C. by reducing the final result in the ratio of 15 divided by T where T is the temperature actually used. If it is desired to run at a greater difference in pressure than the standard 30 millimetres, this may be done for any pressure up to 50 millimetres by multiplying the result by $\sqrt{\frac{30}{P}}$, where P is the pressure actually used. A diffusion sample will be cut from each roll within 9 feet of one end.

Inspection.—All fabric going into the balloon shall be run over a light to detect pinholes and flaws in the threads, any such places being subsequently either proved of sufficient strength and tightness or patched. Inspector may require such tests of diffusion and strength on various parts of the fabric and seams as he may judge necessary to prove the quality required. Every seam will be inspected when completed.

Model test.—Each contractor for one or more dirigibles shall construct a model of linear dimensions one-thirtieth the size of the balloon, made of identical fabric, provided with suitable suspension disposed in similar fashion to that on the full-size balloon. This model to be inflated (upside down) with water to correspond with the full-size balloon when inflated to five times its normal running pressure. This will mean on the model a head of water at the top equal to 12½ feet. Leave pressure on for 10 minutes.

Tests on completed envelope.—Each envelope when completed shall be blown partially full of air and all fabric inspected from the inside against a light to detect small leaks. After inflation with hydrogen at normal operating pressure, the envelope must show a leakage of gas less than 1 per cent per day, with all valves and accessories in place. Envelope, with ballonets in place, after inflation with hydrogen shall be inflated to a pressure of 3 inches of water at lowest point and held there for one minute. This is three times the normal pressure for flight, but no defects shall be developed by this proof test.

Guaranty.—The contractor shall guarantee the completed envelope for three months' continuous exposure to the weather or its equivalent, provided this does not occupy more than one year's time from date of acceptance. Under a pressure test at the end of this time the envelope shall resist without injury a pressure of 2 inches of water at the bottom. In case the envelope fails through deterioration to give the specified length of service, it shall be replaced by the manufacturer at the request of the Government and the manufacturer shall receive compensation for the service rendered by the first envelope pro rated on an arbitrary value of $12,000. Reasonable care shall be taken to keep the envelope out of the sun when not in use, and the fabric shall be dry and cool before packing. Hydrogen gas used shall be free from injurious chemicals or excessive moisture.

Tests shall be made of all fittings, so far as practicable, after completion and before installing in place. This testing shall include air and gas valves, gasoline tanks, oil tanks, blower engine, blower, and instruments; also means for controlling the trimming, ballast, and emergency discharge of fuel tanks. Samples of all wire, cable, rope, fabric, typical seams, patches, etc., shall be broken in a testing machine.

Such other tests shall be made as are necessary to determine that the requirements of the specifications have been fulfilled and that all parts and installations are suitable for the purpose intended.

Mooring eye.—The nose shall be reinforced as shown on the plans by means of a doubling patch of fabric similar to that in the envelope and wood battens about ⅜ inch by 3 inches in section equally spaced, converging at the nose, every alternate batten to extend beyond the doubling 3 feet. An eye shall be provided in the nose for the attachment of a mooring line. This eye will consist of a 1¾-inch metal thimble secured in an eye splice of a four-strand manila rope. The rope will be unlaid and the eight strands let in beneath the doubling patch, equally disposed radially, the ends of the strands frayed and the whole set in cement. The breaking strength of the mooring attachment shall be about 5,000 pounds.

Rip panels, four in number, shall be located approximately as shown with a rip cord, dyed red, run from each through light agate guides to the pilot. By pulling the rip cord weak stops securing the end of the panel are to break and tear open the panels for rapid deflation in an emergency.

Grab ropes, eight in number, shall be secured to patches on envelopes as shown. These to be 1½-inch circumference manila rope secured to crows'-feet of ¾-inch flax signal halyard stuff (braided of 3-ply thread in 8 strands of flax twine; breaking strength, 800 pounds).

Ballonets are located as shown. Their combined volume is 25 per cent of the total volume of the envelope. The relative sizes of ballonets are to be adjusted so that their displacements give equal moments about the center of buoyancy of the envelope when completely inflated. The ballonets are to be fitted with a suspension band of fabric running around the plane of symmetry to which a light flax suspension is to be attached. This suspension holds the ballonet in place and prevents shifting fore and aft when flabby. Sight holes of transparent material are to be placed in the envelope for inspection of this suspension.

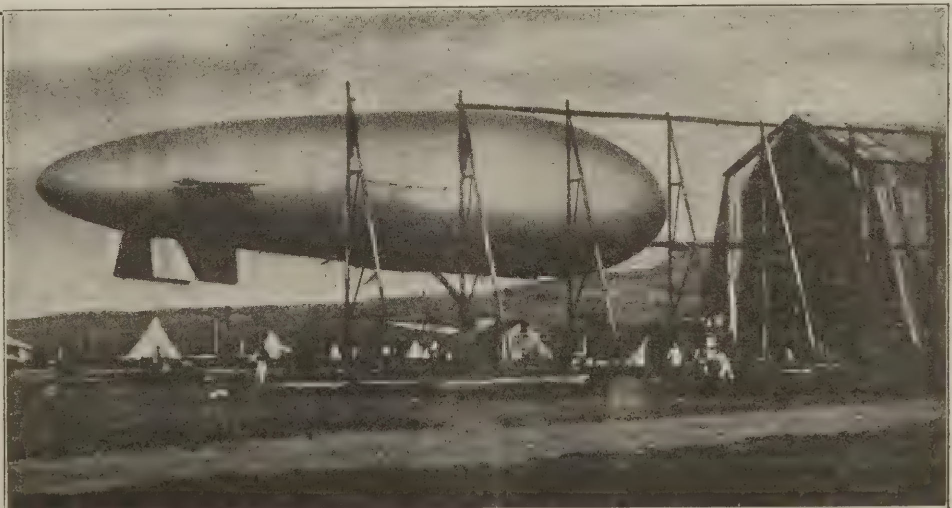
The lower part of the ballonet is to be secured to a patch of doubled envelope fabric sewed and cemented to the envelope. This patch when removed carries with it the ballonet and windpipe connection. A sight hole shall be located in the ballonet patch for inspection of inside of ballonet.

The *safety valve* will be located on top of the envelope. Construction of the valve is shown on detail sheet. This valve is to automatically open outwards when pressure in envelope at lowest point exceeds 1 inch of water.

The *maneuver valve* will be located under the envelope and will operate as a safety valve also, but may be opened by means of a line to pilot's seat.

These valves are to be tested for tightness of seat and the spring loading adjusted as stated on the detail plan before installation.

The *belly band* or *suspension band* is to be a heavy fold of canvas running found the lower part of the envelope, bearing at intervals hardwood toggles for the crow's-feet of the car suspension. This band



A British Blimp dirigible entering its hangar near Saloniki.

shall be securely sewed and cemented to the envelope in a manner which on test is shown to develop the full strength of the latter fabric.

Fins.—Stability of route is assisted by two horizontal fins and three vertical fins as shown. These fins are to be 170 square feet each in area except the vertical fin shown on top of the envelope, which will be 80 square feet in area, and are to be made up of a light structure of steel tubing and wood with internal wire bracing and covered with aeroplane linen treated with five coats of dope and varnished to give a smooth, taut surface. The fins are to be braced by wires with turnbuckles, and crows'-feet to doublings on the envelope. Weight of fins is to be kept down to one-half pound per square foot. Doubling patches shall be fitted on envelope to secure butt edges of fins by lacing.

Rudders.—Two horizontal rudders, each 70 square feet in area, and two vertical rudders, each 35 square feet in area, are to be provided. Both the horizontal and vertical rudders are to be balanced and to work in ball bearings. These rudders are to be securely trussed and operated by nonconducting leads (flexible cable of flax line) passing through agate guide rings, or ball bearing bronze sheaves as indicated on the plans. Rudder operating leads are to be designed to give the least number of turns so as to reduce friction to a minimum. Fins and rudders are to be readily detachable for shipment or stowage.

Insulation.—The car is to be electrically insulated from the envelope and no valve or other operating leads shall be of continuous wire. All metal parts in car are to be electrically connected. Metal parts of valves and their seats, wherever located, shall be electrically connected.

Mooring line.—A mooring line consisting of 200 feet of 2½-inch manila rope is to be provided for carrying coiled in the car. The fixed part shall be stopped to the envelope and the end secured to mooring eye in the nose.

Steering controls.—All steering controls shall be in duplicate and interconnected. The vertical rudders shall be operated by means of foot bars located as shown on the plans, the foot bars to be fitted with foot rests arranged to pivot so as to remain normal to operator's thrusts. The leads are to be fastened to the ends of the foot bar by a suitable fitting. The horizontal rudders are to be controlled by means of handwheels located on the righ-hand side of the car as indicated. The handwheels will be arranged to operate the leads by means of sprocket chain and sprockets in accordance with the plans. Both handwheels are to be provided with an effective band brake so that the horizontal rudders may be locked in position by means of an arrangement for increasing the tension in the brake band.

Tanks shall be provided and arranged substantially as shown on general arrangements plan, sufficient for a 10-hour supply of fuel and oil at full power for the motor.

The main fuel tanks shall be interconnected and so arranged that fuel may be taken from any tank or combination of tanks. Valves shall be operated from the rear seat and shall be quick acting. Fuel tanks shall be of noncorrosive material. If copper tanks are used, they shall be tinned on the inside. Tanks shall, before installation, be tested to an internal pressure of 5 pounds per square inch and must show no permanent deformation. Tanks shall be provided with swash-plate bulkheads. A small plate shall be soldered to each tank, where it may be readily seen, showing weight of empty tank and capacity in gallons. Each tank shall be fitted with an effective gauge to show amount of fuel in tank, and, so far as practicable, visible from rear seat. The three main tanks shall be connected by a length of 1-inch pipe run under them, with quick-acting shut-off valves in the three branches to the tanks. A fourth valve is to be provided for rapid discharge of gasoline to lighten the dirigible in an emergency. Each tank shall have a handhole for filling and cleaning.

Ballast.—The water-ballast tank shall be located in the body and be of 300 pounds capacity, and provided with means for rapid discharge from the pilot's seat. The tank is to be made of waterproof fabric and shall be tight when full.

In addition to trimming the dirigible by manipulation of horizontal rudders or shifting air between ballonets, small water containers are to be placed near the bow and stern of the envelope, fitted with spring loaded valves, and means whereby such valves may be pulled open by the pilot. The forward tank shall contain 40 pounds of water and the after tank 50 pounds of water, and these tanks shall be located at the points shown in the general arrangement plan. The forward tank should be a fabric tube laced along a meridian with a valve in its lower after end. The after tank shall be as flat as possible and secured in a fabric pocket under the envelope and between the lower vertical fins.

Tubes shall lead discharge from each tank to main ballast tank.

Blower system.—A 2-horsepower, 900 revolutions per minute engine of motorcycle type is to be arranged to drive through a 2 to 1 gearing a multivane blower of a capacity of 600 cubic feet per minute at 1,800 revolutions per minute against a head of 2 inches of water. A crank is to be provided for starting the motor which is to be accessible from the rear seat. (See Radio.)

A wind scoop is to be arranged to supply air to the blower, which discharges through suitable dampers into one or both ballonets. The wind pipes to ballonets are of balloon fabric and are to be 8 inches minimum diameter. The air manifold is to be made of sheet aluminum and provided with relief valves spring loaded to release air at three-fourths inch of water pressure.

Precautions similar to those stipulated for the main engine shall be provided for the blower engine to prevent flame from back fire or exhaust.

Radio.—The radio outfit will be supplied by the Government and will be installed by the contractor in the space reserved and indicated on the plans. It will weigh about 250 pounds and will have a generator to be driven by the blower engine through a silent chain and 3 to 1 increasing speed gear. A friction clutch, to be designed so as to reduce weight to a minimum, is to be provided by the contractor so that the blower engine may be run idle or engage either blower or generator.

Car.—The car or body is of standard aeroplane type consisting of a rigid rectangular girder of spruce trussed with wire. The motor and radiator are to be mounted forward, with a sheet steel fire bulkhead behind them; next the pilot with all controls and instruments; next the observer with duplicate controls and radio key; next the blower and radio outfit; next a fabric tank for water ballast; and last the gasoline tanks for 10 hours at full power. Reserve oil and gravity gasoline tanks may be mounted near the motor as shown on the plans. The car is to be inclosed with aeroplane linen except over the motor where the covering shall be of sheet aluminum. The motor compartment shall be well ventilated and the bottom perforated to prevent accumulation of gasoline in case of leakage.

The department will supply and the contractor install a sprinkler type of chemical fire extinguisher with nozzles located near carburetor.

The car shall have a jackstay along top and stirrups under bottom, as shown, to enable a man to reach motor or gasoline tanks in the air.

The maximum propeller diameter permissible is 8 feet 6 inches.

Suspension.—The car is to be suspended from the envelope by means of galvanized-wire cables with breaking strength of 2,700 pounds, arranged as shown. The cables are to be fitted with means for adjusting their lengths to equalize the load. The cables are connected to the suspension band by crows'-feet of braided flax, ¾-inch signal halyard stuff, as specified elsewhere. To carry the car when the dirigible is inclined the upper ends of suspension cables are connected by a fore and aft stay as shown.

The suspension cables shall be connected to the car by hooks or bolts arranged to permit ready detachment.

Power plant.—Includes engine, propeller, radiator, starting device, gasoline and oil tanks, piping, controls, gasoline and oil gauges, pressure gauges, thermometer, power-transmission system, tachometer, necessary shipping crates, etc., in order for flight, and as per the following specifications:

The engine shall be a standard Curtiss OXX-3, 100-horsepower aviation engine, or a Hall-Scott A-7-A, 100-horsepower aviation engine.

The engine shall be provided with an effective starting device, so fitted and installed that engine may be easily started from the front seat. If hand starting is used, a booster coil will be provided.

All oil pipes shall be annealed.

The fuel leads to fuel tanks, the control leads, and the carburetor adjusting rod shall be provided with suitable, safe, and ready couplings where these connections have to be frequently broken.

All couplings and fittings in the gasoline lines shall be thoroughly sweated on.

Gasoline shall be supplied from the reserve tanks to the service tank by pressure feed.

Fuel, water, and oil service pipes will be protected against vibration.

Oil shall be supplied to the engine sump from the reserve oil tank by means of a hand pump operated from the forward seat.

As far as practicable, the entire power plant should be assembled as a unit on a rugged foundation, and should be capable of being readily removed or replaced with a minimum disturbance of connections, controls, or structural fittings.

A complete set of power-plant tools shall be furnished with each engine.

Tachometers of approved type shall be installed on the pilot's instrument board (Reliance No. D-18 with internal counter, or equal).

A thermometer showing the temperature of the circulating water discharge, and one showing temperature of lubricating oil in crank case, shall be mounted on the instrument board (Foxboro transmission type thermometer, or equal).

Each engine shall be fitted with the Bureau of Steam Engineering standard name plate for aeronautical engines.

The air intake opening to carburetor shall be provided with a safety wire gauge sphere of generous size to quench flame in case of backfire.

The motor shall exhaust into an effective muffler at each side so arranged as to cool the gases and to preclude possibility of flame at exit. Tests will be run to prove the effectiveness of the muffler as a flame quencher and if necessary wire gauze may be placed over outlet slot.

Engine tests.—Each engine shall, before shipment from the factory, be subjected to a one-hour full-power run on propeller. During this run revolutions shall be accurately determined and recorded. Report of all engine tests shall be forwarded to the Bureau of Steam Engineering.

With each dirigible the contractor shall deliver the following:

1 ground cloth, 170 by 35 feet.
100 sand bags holding about 40 pounds of sand each.
1 filling balloon or service gas reservoir of 700 cubic feet capacity.
5 screw stakes.
1 extra mooring rope.
200 feet filling tube, 6 inches in diameter, with connecting sleeve.
1 roll of each weight of fabric used.
1 fabric stitcher.
1 fabric roller.
5 gallons of cement.
100 feet of each size wire or cable used.
100 feet of each size rope used.
1 spare gas safety valve, complete.
1 spare maneuver valve, complete.
1 spare gas pressure manometer.
1 set of each size bolts, sheaves, guides, shackles, thimbles, turnbuckles, toggles, or other miscellaneous fittings used—list to be approved by the naval inspector.

Key to Diagram

1	Gas Envelope
2	Car
3	Ballonet
4	Blower Intake Pipe
5	Engine for Blower
6	Main Air Discharge Pipe
7	Air Pipe to Ballonet
8	Air Manifold
9	Operating Cord, Ballonet Exhaust Valve
10	Operating Cord, Butterfly Valve
11	Valve, Pressure Relief
12	Valve, Maneuver Gas
13	Operating Cord, Maneuver Gas Valve
14	Rudder—Twin
15	King Post
16	Leads, Steering Gear
17	Bracing Wire
18	Elevator
19	Leads for Elevator
20	Fin, Stabilizing
21	Doubling Patch
22	Car Suspension
23	Belly Band
24	Webbing
25	Ballonet Suspension
26	Nose Reinforcement
27	Rip Panel
28	Rip Cord
29	Grab Ropes
30	Weights
31	Mooring Rope
32	Sight Holes
33	Patch for Removing Ballonet
34	Kapok Floats
35	Fuel Tanks
36	Muffler
37	Trimming Tanks
38	Operating Cords, Trimming Tanks
39	Guides for Operating Cords
40	Filling Hole and Doubling Patch

FOREIGN NEWS

AUSTRALIA

The seventh officer's course in aviation will be held at the Central Flying School, Laverton, from February 1st to May 1st, 1917. Applicants must have volunteered for active service, and will be regarded as available for appointment to any unit of the A. I. F. on active service, and for embarkation at any time after the commencement of the course. Such officers may not qualify for pilot's certificates until they complete a course of instruction abroad.

The *Sun* of November 5th reports that while flying in an aeroplane which he built himself in Australia, Mr. Basil Watson made a nose dive of 2,000 feet and looped the loop twice.

Mr. Watson, who is the son of Mr. J. I. Watson of Foileleugh, Brighton, went to England about three years ago and joined the Sopwith Company as a mechanic. He subsequently became a pilot and then was engaged in testing machines for the British admiralty.

About three months ago Mr. Watson went back to Melbourne, and a fortnight later began to build an aeroplane at his father's home. The timbers used in the frame were Tasmanian ash and mountain ash. He made the propeller of Queensland walnut.

The machine is a tractor, scout biplane, and was built on general lines which Mr. Watson gathered in England. It is motored by a 50 h.p. Gnome engine.

The biplane was conveyed to Point Cook, where the flying school authorities had given permission for trials to be held. In a short test it was found that the machine was capable of a speed of 80 miles an hour. It was also found to be very stable and capable of being flown for short distances with no control being exercised.

On October 30, the machine was given its first real trial. It was taken up and remained in the air for 45 minutes. Mr. Watson took it up about 5,000 feet and after manoeuvering for a half-hour dropped into a nose dive of 2,000 feet and then made two perfect loops at a height of 3,000 feet.

AUSTRIA

Emperor Charles of Austria-Hungary narrowly escaped death from the bombs of Italian aviators who attacked the crowds at the funeral of Admiral Hause, late commander of the Austrian navy, at Pola, the Austrian naval base, some days ago.

The Emperor, the Archduke and other dignitaries attended, and the Kaiser planned to attend, but was delayed at Vienna and could not reach Pola in time.

As the funeral cortege passed through the streets the Italian aeroplanes appeared, the aviators dropping explosives and incendiary bombs upon the crowds. The Emperor narrowly escaped death. The Austrians are now conducting reprisals against Udine and Venice.

BRAZIL

The cuts of the model below illustrate a projected aeroplane to be manufactured in Brazil, and the inventor, Mr. Escobedo, claims some remarkable properties for it.

Heretofore, says the inventor, aeroplanes have been constructed to carry all their weight forward near the wings. The inventor claims that not only will he be able to distribute the weight over almost the entire fusilage, but will be able to carry 40 people. The aeroplane has been patented in Brazil and the inventor is taking out patents in other countries. A short description follows:

Wing surface, 222 sq. metres; Stabilizer, 40 sq. metres; Total area, 262 sq. metres; Motors, 2 motors of 500 h.p. each, driving four propellers. Each motor is attached in such a way as to drive the four propellers independently. The inventor expects a speed of 150 kilometres an hour. Ailerons are used for lateral stability. Fusilage, 13 metres in length and 2½ metres in width. Two of the propellers are pushers and two are tractors. A cabin is situated in the front part of the fusilage with dimensions of 2 metres deep by 2½ metres wide and 3 metres long. In this cabin is room for observer, pilot, wireless instruments, and tanks for large quantities of gasoline. The inventor states that the aeroplane will be lighted by electricity.

FRANCE

Corporal Ronald Hoskier of New York, one of the dozen or so brilliant American pilots actually at the front, defeated single handed a two seated German biplane, armed with three machine guns Friday morning and returned safely with other Americans to their camp while the enemy machines limped feebly to its lines. Hoskier was mounting guard with C. C. Johnson and Corporal E. Genet when the German appeared.

Because it is necessary for one-seater chasing machines to fight alone his companions stood off while Hoskier attacked. The hostile craft was willing to fight, and kept steadily on its course as Hoskier rushed at it, but it had not fired more than a dozen rounds of ammunition before it suddenly dropped, uncontrolled, 1,000 feet. Hoskier's machine gun fire had reached the German pilot, but the latter, though evidently wounded, was able to straighten out the machine and plunge into safety within his own lines, where the American was forced to abandon the chase.

The Lafayette Squadron at the front now consists of the French officers Captain Thenault, Lieutenants De Laage and De Mux, and the Americans William Thaw, Ralph Lufbery, C. C. Johnson, J. R. McConnell, Willis Haviland, Robert Soubrian, Ronald Hoskier, E. Genet, Edward Parsons, and Stephen Gigelow.

Three more Americans have concluded their aeroplane schooling at Pau. They will join the Lafayette Squadron. They are Edward Foot Hinkle of Minneapolis, and Harold Willis and Walter Lovell of Boston. Mr. Hinkle, though an elderly man with a son who is a Yale graduate, proved a most apt pupil.

Charles Sweeney of Seattle, who is the only American who has attained the rank of lieutenant in the French infantry, is now commanding a section of "tanks," or armored cars.

GERMANY

The following is a dispatch to the New York *Globe* by Oswald F. Schnette, their German correspondent.

"Future wars and possibly even this spring's offensive will be decided in the air," said a representative of the German aerial forces to me. "We are confident of our supremacy. No other weapon has made such progress in the war as the aeroplane. To-day no aeroplane is considered a fighting machine unless it is armed with five or six machine guns and is capable of a speed of from 120 to 140 miles an hour. We have the best speed because we have strong stationary motors, while the enemy's rotary motors are incapable of producing a speed much in excess of 100 miles an hour.

"The machines we are building will serve in time of peace as well as in war, and it will be possible to go from Berlin to New York in twenty-four hours. Airships can now reach a height of 10,000 metres (6.2 miles), and photographs from them can be made at a height of 4,000 metres (2.4 miles), so perfect that they show the guns of the batteries. That is the result of German science and German skill."

GREAT BRITAIN

According to the London *Aeroplane* a giant aeroplane has been recently completed in England and in a test flight carried 21 persons a mile into the air. It is stated that the machine was designed by F. Handley Page, a prominent British constructor.

JAPAN

The following news items are from the *Japan Times*.

Jan. 18, 1917.—The exhibition by Miss Katherine Stinson on the 14th and 15th at Nagoya having ended in a failure, the aviatrice carried out another flight on Tuesday afternoon on the harbour reclamation ground. The aviatrice left the ground at 2 p.m., but when the machine was over the harbor works the propeller suddenly stopped and the machine was precipitated like a shooting arrow, until about 200 metres above the ground when the rudder recommenced to work and Miss Stinson landed safely after a very narrow escape. It appears that a crank which had been damaged in the previous day's flight, gave way and caused what was nearly a fatal accident.

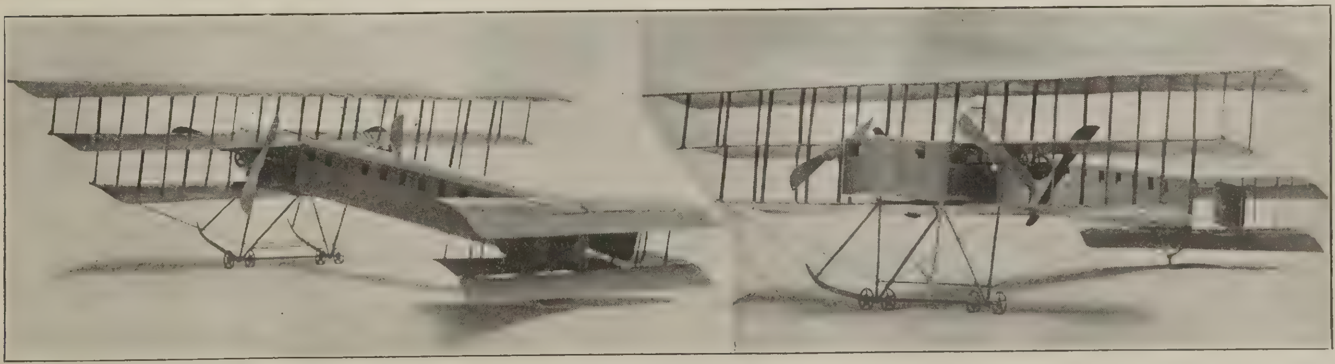
Miss Stinson fortunately escaped scatheless, though her machine was somewhat damaged in landing.

Lieutenant Chikataka Kawakami who resigned from the flying corps at Tokorozawa last year, has recently arranged a plan to carry out flights across Osaka bay toward Wakayama. He is backed by Mr. Hidezo Umeda, a wealthy Tokyo man, who is much interested in the development of aeronautics in this country.

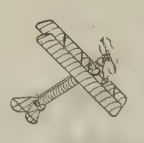
Jan. 17, 1917.—Lieutenant Toyoo Yamamura, a naval air-pilot from Oihama, took out aeroplane No. 12 yesterday morning at 9.15 with Hirai, a sailor, as passenger. For twelve minutes, the Lieutenant soared above the sea successfully, and at 9.27, came down toward the Mother boat, Wakamiya. As he steered toward the landing board, a stiff wind tipped one of the wings of the machine, and the hydroplane fell into the sea.

Witnessing the accident the officers of the Naval Aviation Corps at Oihama, immediately ran to the scene, and found that Lieutenant Yamamura was tied to his seat by a belt. The machine being entirely under water, it was impossible to remove Lieutenant Yamamura from his seat, but the officers and sailors pushed the machine on to the landing board, and finally succeeded in saving the Lieutenant from drowning.

The Lieutenant was under water, for almost 20 minutes and was unconscious when taken from the sea. He died later in the day. A further report of the accident says that his trousers were held fast by a wire, which prevented his freeing himself. It is believed that if he had only been held by a belt, he would have been able to free himself, but it seems that he struggled to free his leg at first, and before he could do so, became unconscious.

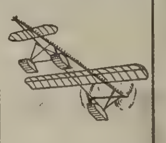


The Escobedo Triplane



MODEL NEWS

Edited by G. A. Cavanagh



CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

YOUNGSTOWN MODEL AERO CLUB
924 Wabash Ave., Youngstown, Ohio

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge Street, Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
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SPRINGFIELD MODEL AERO CLUB
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MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

A Scale Model

The model shown in the accompanying photograph and described herewith was constructed by Mr. Matthew H. Mawlinney of Pittsburgh, Pa. The model is 26 inches long and is built to scale from actual specifications as follows:

Fusilage: This is built up of wood braced with wire and partially covered with cloth.

Running Gear: The frame supporting the wheels is constructed of wood and aluminum. The forks are mounted on swivels and connected so that when one wheel turns, the other one turns also at the same angle. The rear skid is of reed.

Bracing System: This consists of an overhead truss frame of wood from which the wings are braced and of a frame under the fusilage which supports the warping wires.

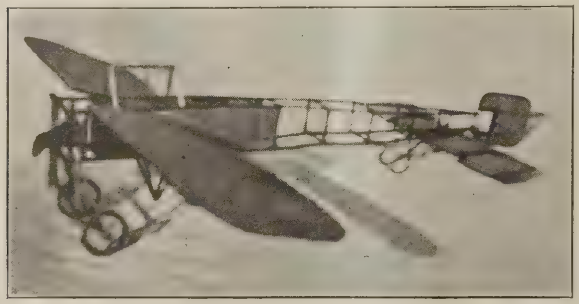
Tail: The tail, or rear plane, is made in three sections so that the two outside sections may be turned to regulate the elevation. An aluminum rod runs through all three sections and is fastened immovably to the two outer sections so that when the rod is turned, the elevating planes move in unison.

Rudder: This is built of wood, edged with reed and covered with cloth on both sides.

Wings: These are built up of wood and reed and are covered with cloth.

Motor: This is of wood and is a model of the Anzani motor.

Controls: The entire machine is controlled from the driver's seat. A steering post surmounted by an immovable wheel as a handle controls the elevation or warping by a forward or sideward movement. The steering is done by a foot lever.



Scale Model of Bleriot Monoplane—Constructed by Matthew H. Mawlinney, Pittsburgh, Penna.

A Model Taube

In our next issue we will reproduce a photograph of an Etrich Taube, which was built by Mr. David Hay. The machine measures, length, 5 ft.; span, 5 ft. 9 ins.; propeller, 16 ins. diameter; wheels, 2¾ ins. diameter; fitted with pilot's and passenger's seats; and all parts workable, all planes double surfaced. Mr. Hay states that he made the model for Christmas, and took the photos, before doping the machine, as he had an idea that the dope would change the color of same. It took him three months to complete, but he made some flying models in between that time; thinking it the best way when making such a model.

Paper Models

Mr. W. Burrows of England is an advocate of paper models, and in writing to *Flight Magazine* concerning his achievements he states as follows:

C. W. Meyers' World Record R. O. G. Model which attracted considerable attention at the Pan-American Aeronautical Show

"In my models I use a rectangular *fuselage*. The measurements of all my models have been taken from the scale drawings and successful flights have been made with Avros, Sopwiths, Shorts and Curtiss.

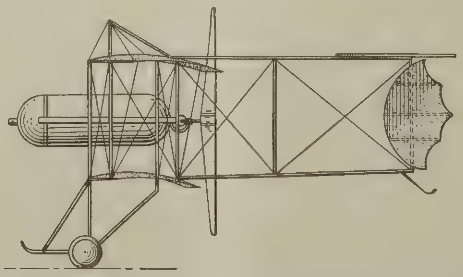
"For the particular design which I find most successful, I have taken the measurements from those of the H. Farman, the upper plane being 6½ ins. span and ¾ in. chord, and the lower 3¼ ins. span by ⅝ in. chord.

"At first the gliding angle was about 1 in. 5/6, the planes being flat, but by adding a slight camber the angle was increased to 1 in ⅞, and the stability was materially improved. These two facts were noticed in all four types, but the H. Farman was superior to the others in length of glide and stability. As the Farman model has no dihedral and no stabilizing fin (the rudder is for purely directional purposes), I am convinced its exceptional stability is due to the overhanging top plane. In gusty winds, other models with both planes of equal span, the Sopwith particularly, have frequently capsized, but the Farman has never done so; the wind simply tipping up one wing tip and altering the direction of flight.

"I have also noticed that though good glides can be made with models exactly to scale, the length of such glide can be increased by increasing the length of *fuselage* in front of the main planes. This applies to all types of biplanes, though not to monoplanes.

"With my Farman model the longest indoor flight has been 35 ft. when launched by hand and thrown parallel to the earth (*i.e.*, not *up* in the air), and the longest outdoor flights have been 50 ft. with a following wind and about 20 ft. against it.

"I may state that outdoor flights are far more interesting than indoor flights."



Compressed Air Driven Model of A. B. C. Pusher Biplane

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

An Aeronautical A B C

An **A**eroplane is a production of precocious minds which flies.

A **B**iplane is an aeroplane with twice the room for the defects of a monoplane.

A **C**asualty is a by-product of an aeroplane smash.

A **D**istributor is what everyone who knows nothing of Gnomes talks about.

An **E**yebolt is a thing with a hole in it which provides opportunity for the display of metallurgical ignorance.

A **F**light is a thing you leave behind you when you wake up with your head on the floor and your feet on the top bed-rail.

A **G**ear-box is a thing which every embryo pilot thinks he wants, but which would be no use to him if he had it.

A **H**ustle is that which a transport officer gets on when he is ordered to ship a seaplane "immediately" on a vessel which has just been reported off Gibraltar.

An **I**nspector is a person who could build an aeroplane if he were reincarnated.

A **J**oystick (officially known as a "control lever") is an instrument which brings sorrow when abused.

A **K**ite-balloon was the result of Japanese art, a late supper and a bad dream.

A **L**anding has as many degrees of hardness as a lead pencil.

A **M**istake is when a five-eighths bolt is designed to screw into a quarter-inch nut.

A **N**acelle is a receptacle for babies of various sizes and ages.

An **O**rnithoper is a flying machine frequently seen by probationary sub-lieutenants, R.N.V.R. or R.N.A.S., in the Isle of Sheppey.

A **P**hysical laboratory is a place where they concoct empyrical formulae from insufficient or inaccurate data.

A **Q**uick-release gear is an ornament which dangles from many aeroplanes, but which has never been known to have been used.

A **R**evolution indicator is an instrument to show when the engine stops.

A **S**pring is an animal of very uncertain temper.

A **T**ishbite is a biped which can talk, dress and fly badly, but can do nothing really well.

A **U**niversal joint is chiefly notable in that it is liable to come unstuck in any direction.

Volubility is the consoling angel which comforts an aviator when he arrives over an enemy fortress and discovers he has left his bombs at home.

A **W**iseacre is a designer who allows other people to test the results of his brain storms.

An **X** is a thing which a slide rule artist plays with when he is anxious to prove that a ten-ton wire will carry a fifty-ton load.

A **Y**ankee is a person who can sell aeroplanes to everybody except his fellow-countrymen.

A **Z**eppelin is the enemy airship which destroyed London two years ago.

W. L. W. in the *London Aeroplane.*

From Our Own Hashimura Togo

To the Editor of that AERIAL AGE (which like name, rises to occasion).

Dear Mr. Editor:—

Being again in Hon American cooler, slangly called jail, and being disabled to see you in the present time, I right to tell you of mutch misfortune attending efforts to exhibit Japanese aeroplane at Aeronautical Exposition, where progress in flying are show to ignorant people at fifty cents per each for ommission price. But why? (You ask me this) Lissen, I correspond, for story of great saddity.

Although I kept my planning secreted from hon Editor, for past two months I have been working sixteen hours dayly with hundred Japanese workman, who I promise money. (*Promise* costs nothing). Finnally aeroplane are depleted and ready for what may happen. It are beutiful machine of two wings, weels, etc., but owing to sad lack of currency, posess no motor of any discription. However, notwithstanding lack of motor, I resolve to show machine at Exposition, and by use of dark specticles and sign "Please help blind" I manidge to gather sifficient money for space at show.

Arriving with aeroplane an mekanicks at show, we unload machine and enter it into building.

"Ha ha, Japanese Invasion," laugh ignorant German workman who are doing general destruction of aeroplanes on floor.

"Ignorant pig of a dog," I gush with anger, "Japan are at friendship with Uncle Samuel, and Kaisers diving boats will soon produce nice new war for German nobil fambly to dekorate with iron crosses."

"Since when are Japanese intelligent to talk English?" (From him, with curse.)

"Japanese learn English wile Germans remain in beer gardens making selves intoxicated!" (This are my answer, in tone of high insult.)

His next remark are not fit for Paper of Uncosmopolitan circulation. My answer are left jab to jaw in manner of prizefighter. He return with right hook to eye. My brother Ichi enter proceedings with well directed blow to head with propeller of great lightness but strength. In few minutes place are seen of conflickt closely resembling Irish brick fight. At this point poleecman enter swinging clubs.

My coller are seized in strong grip and I am propelled forward to waiting wagon which resemble ambulance.

"Thanks," I offer. "But I am practically undamaged. Take other man to hon. hospital."

I then find out I am in patroll wagon, not ambulance. I am now in small sell in jail, waiting for sentence by Mikado of poleece force. Having blow on head I feel like intoxicated man. Hoping you are the same.

HASHIMURA TOGO.

Y'MEAN TO SAY ETHELBERT BROKE TH' WORLD'S RECORD FOR REMAINING IN THE AIR?
YES HE STAYED UP SO LONG. WE HAD TO SEND ANOTHER MONOPLANE UP AFTER HIM"
I TELL YOU M'BOY, THIS'LL GIVE US ENTRE TO THE SWELLEST SASSIETY HERE AT BLUFFIT -BY-TH'-SEA.
WHAT D'YOU KNOW ABOUT IT HEY? HE'S ONLY BEEN RUNNING A MONOPLANE TWO DAYS; AN' HE GOES AN' BUSTS A RECORD!
I GOT TO HAND IT TO YOU ETHELBERT OL' KID. I DON'T SEE HOW Y'EVER DID IT! GOSH! HOW DID YA?
I'LL TELL YOU IF YOU PROMISE NOT TO TELL'
HANGAR NO. 5
Y'SEE I HAD TO STAY UP BECAUSE I DIDN'T KNOW HOW TO GET DOWN! FINALLY THEY SENT A GUY UP AFTER ME, AN' I SAW WHAT HE DID TO GET DOWN, SO I DID TH' SAME'
HANGAR NO 5
POP

Courtesy of N. Y. Globe

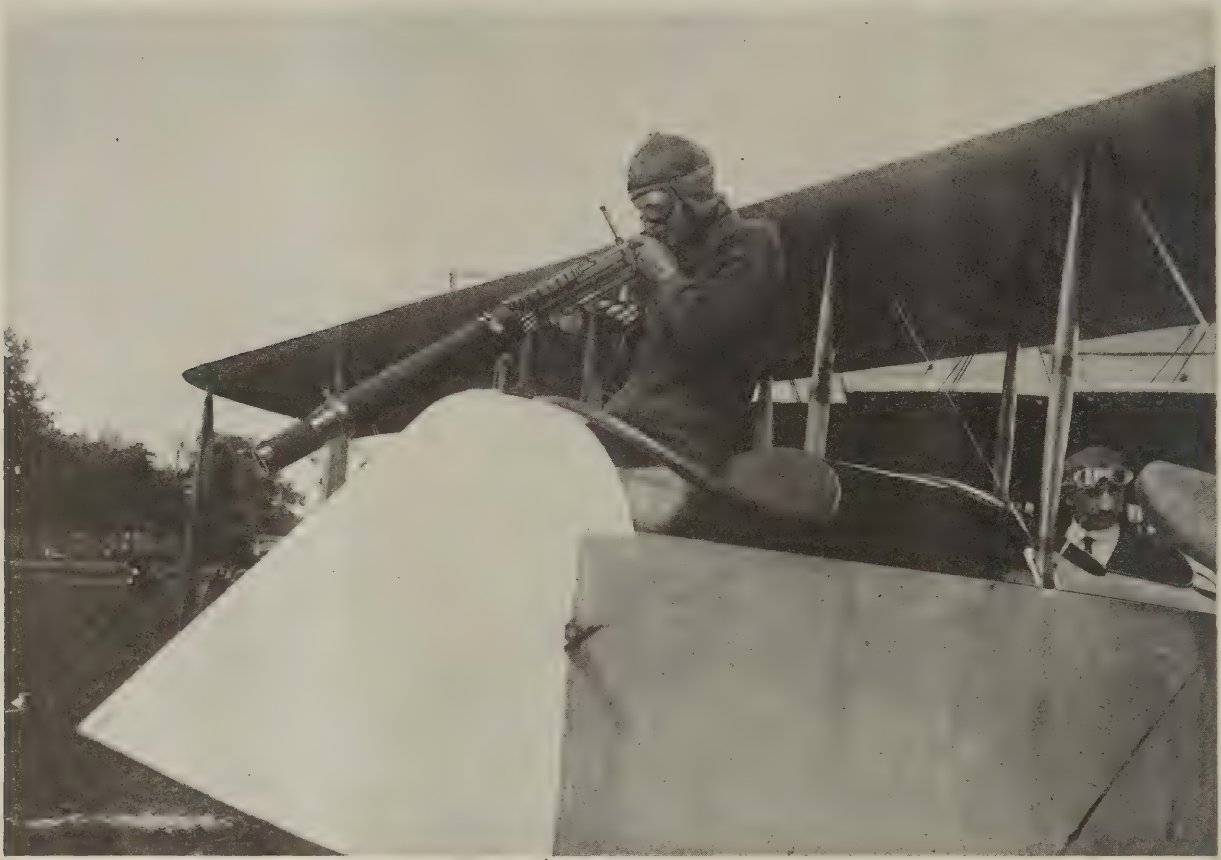


Photo copyright by Underwood & Underwood

Battleplane with Lewis Machine Gun mounted on bow of car. This plane was the first of its kind in the world

"In my private opinion the Lewis Machine Gun is the best light type gun yet developed for troops in the field."

Major-General LEONARD WOOD,
Commander of the Department of the East.

General Wood stated he "favored having . . . a reserve supply of 25,000 machine guns as in the end one in ten men will carry a 26 lb. machine gun as he now carries a rifle."

Statement made by Major General Leonard Wood testifying before the Military Committee of the House of Representatives reported in New York World, January 28th, 1916.

SAVAGE ARMS COMPANY

Executive Offices: 50 CHURCH STREET, NEW YORK
Factories: UTICA, NEW YORK

Above All:—Strength

The knowledge of strength engenders confidence, and the direct result of confidence is the will and power to excel. No matter from what angle we consider the aeroplane and the dirigible, STRENGTH is of paramount importance, completely overshadowing other characteristics of the machines of the air.

It is but common knowledge that a chain is as strong as its weakest link, and it is not stretching the point to say that the aeroplane is efficient, strong and sturdy as its fittings and special parts.

STRENGTH, however, is not mere bulk, brute power or weight. Anyone could build strong fittings,—but the fittings would undoubtedly be far too heavy for the modern machine. Strength, then, in the aeroplane, must be the result of scientific research, absolutely the finest of materials, and *hairline precision.*

ACCURACY can result only from long experience at a task, and conscientious adherence to the scrupulous performance of it.

SERVICE is obtained in direct proportion to the knowledge, skill, materials,—and *conscience* put into the manufacture of a product.

The Erie Specialty Company is now supplying Screw Machine Products and Aluminum Castings to the leading aeroplane companies:—the aeroplane companies which desire the finest fittings and special parts that modern science and skill can produce.

Every part that leaves the factory of the Erie Specialty Company is tried, tested, and proved perfect.

We shall be glad to hear from those manufacturers of aircraft whose desire is for Screw Machine Products and Aluminum Castings which are accurate, strong, and efficient. Tell us your requirements and we will submit estimates and early delivery dates.

ERIE SPECIALTY COMPANY

ERIE, PENNA.

(*Continued from page* 714)

buildings to house the machines that they may purchase, or lease any of them. There is no way in which to do it. And I want to confess, Mr. Chairman, that, so far as I am concerned, I think it is subject to a point of order, and that is the reason I said that I would withdraw my amendment if the point of order was going to be insisted on.

Mr. SHALLENBERGER. I would like to call the Chair's attention to the fact that the same appropriation bill which carries this appropriation for aviation purposes carried an appropriation of $300,000 for the specific purpose for which they now seek to use this money, and that money has been spent for land, showing that it was the intention of Congress when they appropriated that money to have it spent for that specific purpose.

Mr. DENT. Mr. Chairman, I withdraw my proposed amendment.

Mr. STAFFORD. I withdraw the point of order.

Mr. KAHN. Does the gentleman withdraw the entire amendment?

Mr. DENT. I think the point of order would lie on the other.

The CHAIRMAN. Does the gentleman understand that the amendment is withdrawn and the point of order is withdrawn?

Mr. STAFFORD. The point of order is withdrawn on the statement of the gentleman that he does not intend to press the amendment increasing the appropriation.

The CHAIRMAN. Does the gentleman understand the point of order is intended to be withdrawn, and the amendment likewise?

Mr. DENT. Yes.

The CHAIRMAN. Then, without objection, that will be done.

Mr. CALDWELL. Mr. Chairman, I understand now that the point of order having been withdrawn, there are some words—and I do not want to take advantage and ask for a larger appropriation, although I am in favor of one—there are some words that ought to go into this section, even if it carries $1,000,000. I do not want to take an unfair advantage with the gentleman, who withdraws the point of order. If he means——

Mr. STAFFORD. I did not wish to enlarge the scope of it, I have no objection to the insertion of the word "acquisition."

Mr. CALDWELL. The last one may be grounds for the Army.

Mr. STAFFORD. That extends it away beyond the scope of any mere authorization. I would object to that.

Mr. CALDWELL. The first two amendments, I understand, then, will be in order?

Mr. STAFFORD. I will not press the point of order against those amendments.

The CHAIRMAN. What is the agreement of the gentlemen?

Mr. CALDWELL. I move to amend by inserting after the word "appropriations," in line 14, page 8, the words "for aviation," and after the word "the," in line 16, the words "acquisition by," and after the word "purchase," in the same line, the words "by condemnation or otherwise."

The CHAIRMAN. The Clerk will report the amendment offered by the gentleman from New York.

The Clerk read as follows:

> Page 8, line 14, after the word "appropriations," insert the words "for aviation."
>
> On page 8, lines 16, after the word "the," insert the words "acquisition by."
>
> On page 8, line 16, after the word "purchase," insert the words "condemnation or otherwise," so that the proviso as amended will read:
>
> "*Provided further,* That the sum of $1,000,000 may be expended out of the appropriations for aviation provided by the act of August 29, 1916, for the acquisition by purchase, condemnation, or otherwise, of sites and construction of buildings for aviation schools."

The CHAIRMAN. The question is on agreeing to the first amendment offered by the gentleman from New York [Mr. CALDWELL].

The amendment was agreed to.

Mr. CALDWELL. Mr. Chairman, that is all one amendment.

The CHAIRMAN. The question is on the second amendment offered by the gentleman from New York.

The amendment was agreed to.

Mr. CALDWELL. Mr. Chairman, I offer another amendment. I would like to have the attention of the gentleman from Wisconsin [Mr. STAFFORD], because I do not want to take an unfair advantage of him. After the word "buildings," in line 16 of the same section, I want to add, "the improvement of land and water front continguous thereto."

The reason I propose that is this: At one of the stations we find we can not use the hydroplanes for the reason that the water is too shallow, and they must do some work in connection therewith. I want to put in these words in order that the work may be done. It will cost only a few dollars, but it ought to be done.

Mr. SHALLENBERGER. Mr. Chairman, will the gentleman yield for a question?

The CHAIRMAN. Does the gentleman from New York yield to the gentleman from Nebraska?

Mr. CALDWELL. Yes.

Mr. SHALLENBERGER. I understand the Committee on Appropriations are providing for hydroplanes.

Mr. CALDWELL. Yes; for the Army. This is only hydroplanes for the Aviation School, not for the Army.

Mr. STAFFORD. I have seen the station at Absecond, near Atlantic City, and——

Mr. CALDWELL. They do not have the right kind of a place there.

Mr. STAFFORD. They have only 10 feet of shore and a channel right in front.

Mr. CALDWELL. I hope the gentleman from Wisconsin will not object.

Mr. STAFFORD. I will not.

Mr. SHALLENBERGER. I shall object, Mr. Chairman.

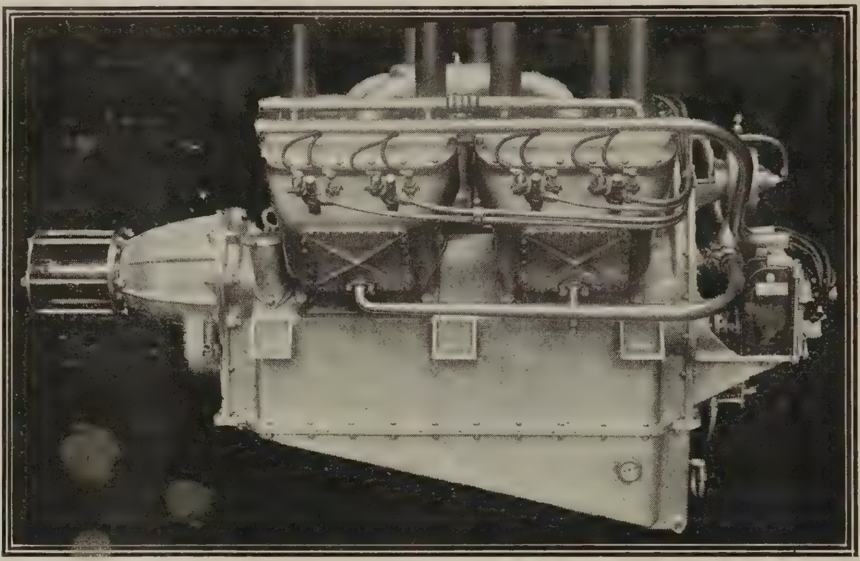
The CHAIRMAN. The gentleman from Nebraska objects.

Mr. CALDWELL. I will withdraw the amendment, then.

The CHAIRMAN. There is a third amendment still to be submitted to a vote. The question is on the third amendment, offered by the gentleman from New York [Mr. CALDWELL].

The amendment was agreed to.

Mr. CALDWELL. Mr. Chairman, I withdraw the fourth amendment.



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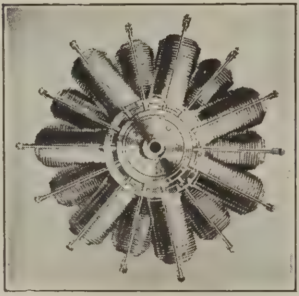

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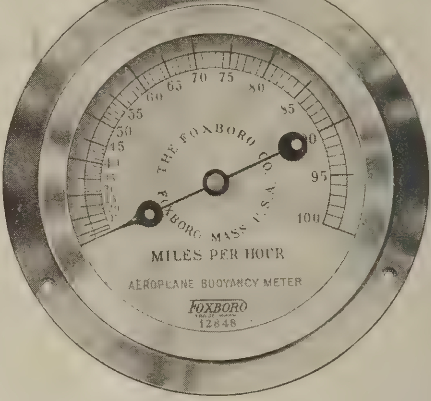

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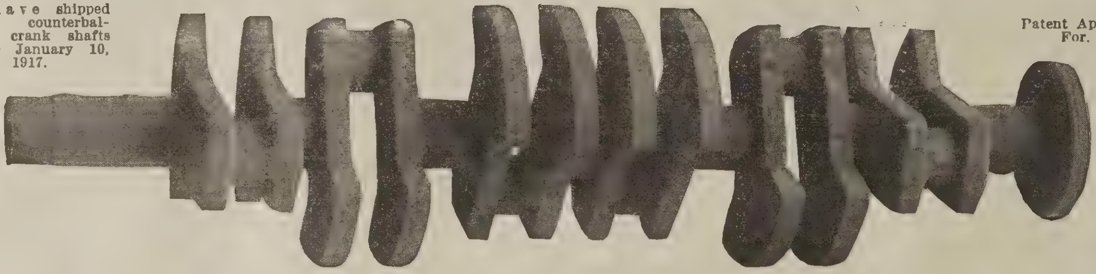

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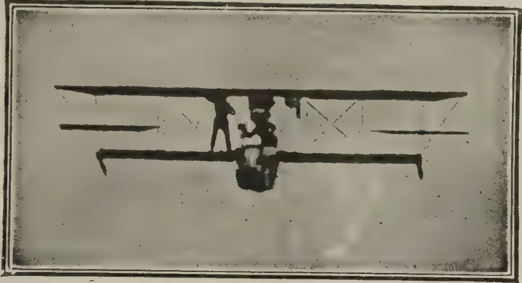

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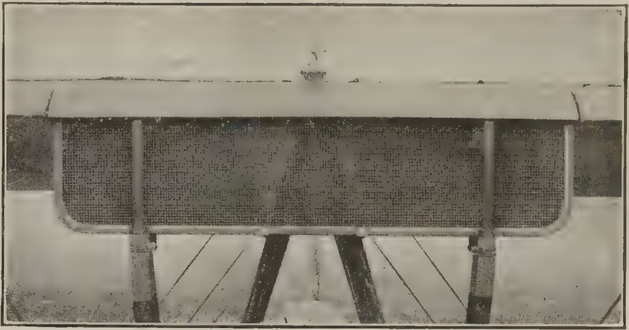

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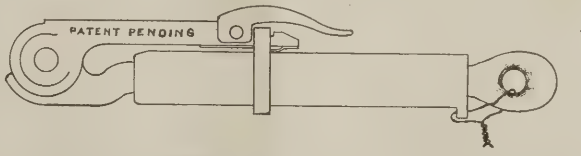

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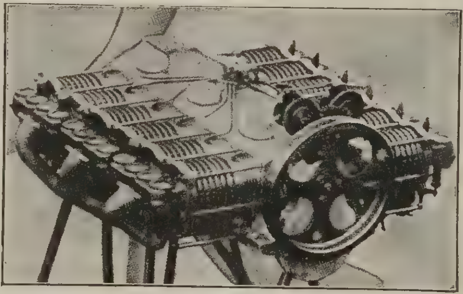

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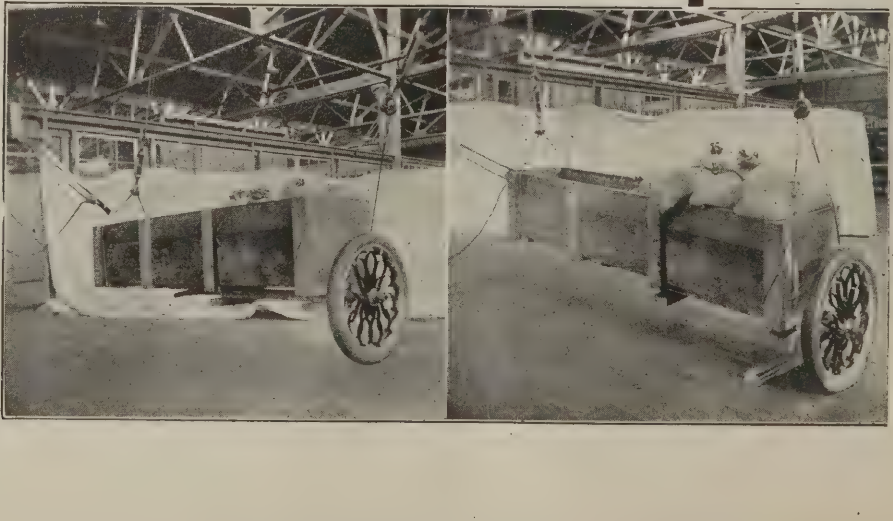

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$150,000,000 EMERGENCY FUND PROVIDES FOR ADDITIONAL EXPENDITURES FOR NAVAL AERONAUTICS

THE Aero Club of America's complaint that only $5,130,000 was allowed for naval aeronautics, which is less than one per cent of the total naval appropriation assisted in putting through Congress the Naval Emergency Fund of $150,000,000, which provides for additional expenditures for aeronautics.

The present appropriation of $5,130,000 will not go very far in developing naval aeronautics. We need an aeronautic center at each of our 15 naval districts and each center ought to have between fifty and one hundred seaplanes, two rigid dirigibles, half dozen non-rigid dirigibles and half dozen observation balloons. And there should be one aeroplane ship and one balloon ship to every eight battleships in our fleets.

SOMETHING MUST BE DONE TO THE MISGUIDED PEOPLE WHO PERSIST IN ATTEMPTING TO DELAY TRAINING OF AVIATORS NEEDED FOR NATIONAL DEFENSE

THERE are people who do not appreciate the importance of training a large number of aviators immediately. For instance, a six-months' old aeronautic contemporary, which is published by men who have only been in aeronautics a few months, and has been printing some especially bitter and destructive criticisms of the American aeronautic industry, prints another of its typical editorials in which it characterizes the appeal for more aviators as "hysterical," and concludes with the following:

"Whenever the constructors are in a position to deliver military types of aeroplanes in quantities, the country will have the aviators to fly them . . . The personnel problem is comparatively easy of solution because so long as the attraction of flying as an adventure remains, there will be no lack of young men who are willing to learn to fly at the Government's expense. But there is no use in training civilians to fly unless some possibility exists of fitting the aviators out with fighting machnes when the war comes."

Those responsible for this are not aware of the fact that it takes at least six months to train an aviator. Being new in aeronautics and ignorant of military aeronautics, they do not know that it takes four months of preliminary and technical training before an aviator is ready to practice with the fighting machines, and that we still need aviators trained to cooperate with the artillery, which does not involve flying either fast or fighting machines.

People with a narrow attitude like that of the ill-advised editors of this new aeronautic publication have been responsible for the long delay in upbuilding our aerial defenses. They undermined the work and obstructed for a time the progress of the progressive military and civilian authorities who, realizing the need, urged preparedness and helped to get what little preparedness we now have. Governor Charles S. Whitman of New York put the case most aptly when, during his address, at the opening of the Pan-American Aeronautic Exposition which, thanks to the splendid work of the Aero Club of America, was such a signal success, said:

"What measure of preparedness we now possess is due in small degree to the compulsion of the majority, but rather to the determined insistence of a minority. And not the least of the forces that have fought for the wise thing, reading the future with clearer vision than their fellows, has been the Aero Club of America. Its task has not been easy, for of my knowledge I know that its progress has been blocked by every misunderstanding, but never at any time has there been a hint of discouragement; any cessation of dynamic effort. And if no other result has been achieved, the existence of the Aero Club would be justified by this exposition that now gathers and directs not only the aeronautical genius of the United States, but of our sister Republics."

Today is the day of vindication for those patriots who worked untiringly for the upbuilding of our aerial defenses and it is the day when the obstructionists must be made to realize the grave responsibility which they are assuming in retarding the training of a large number of aviators.

Brigadier-General W. S. Brancker, Director of Air Organization in the British Army, recently delivered an address in London on "Training in Military Aviation." The complete text of this address is to be published in AERIAL AGE beginning with next week, but we will quote here some passages which prove how absurd is our contemporary's claim that "there is no use in training civilians to fly unless some possibility exists of fitting the aviators out with fighting machines."

We quote from Brigadier-General Brancker's statements regarding the career of a civilian who wishes to join the Royal Flying Corps:

> "Now I will take the career of a civilian who wishes to join the Royal Flying Corps now. He first has to join the Service as a cadet and go through a course in the Cadets' School, at which military subjects pure and simple, are taught. He gets a grounding of drill and discipline, care of arms, interior economy, military law, and the use of the machine-gun; *this course lasts about two months*. From this the cadet is sent to a Flying Corps Training School, School of Military Aeronautics, where he begins his technical training on the ground. He goes through a course in the care of engines and rigging. He is given some ideas on the theory of flight. He is taught wireless signalling and receiving. He gets instruction in the care of machine-guns, in the use of the camera, in map reading, in the observation of artillery fire with models, and in his spare moments he gets a certain amount of drill. *This course lasts another two months,* and if he gets through this successfully he is given a commission on the General List. He then joins a preliminary training squadron as a pupil, and starts his instruction usually on the Maurice Farman, his training both in military and technical subjects going on concurrently. After reaching a certain standard of efficiency, and having completed a certain number of hours in the air, he is sent on to an advanced training squadron or Service squadron, where he learns to fly Service types of machines for military purposes, and eventually qualifies for his wings. He is then gazetted as a flying officer of the Royal Flying Corps, and posted to a Service squadron. If he shows exceptional promise as a pilot *after his qualification* he is sent to the Central Flying School, *where he is given extra higher instruction on fighting scouts.* During the period of advanced training he goes through a course of aerial gunnery away from his squadron. The total time in the air usually required to reach the qualification stage is about 30 hours' solo in present circumstances, but, of course, the length of time that it takes to reach this standard depends entirely on the weather and the number of aeroplanes available. During the winter it works out to about four months, but in the summer it is considerably shorter."

In other words, the student receives six months of training before he qualifies to receive the "extra higher instruction on fighting scouts."

The public will be pleased to know that the present administration of the Aviation Section, Signal Corps, which is headed by Brigadier-General George O. Squier and Lieut. Col. John B. Bennett, is also in favor of training a large number of aviators immediately. Colonel Bennett's first step upon taking charge of the Aviation Section, which step was approved by General Squier, was to send a good number of applicants for the Aerial Reserve Corps to aviation schools to train. And more are being sent daily.

The need of immediately placing a large number of aviators under training is imperative.

As was brought out on the floor of Congress, we are now making infinitely more machines than we have aviators for. As a matter of fact, the Mineola Aviation School has at the moment of writing about twenty machines still crated which it cannot use. The Memphis Aviation school has also more training facilities than it has pupils to train. Pensacola also has a score of aeroplanes still uncrated, owing to shortage of personnel.

So the essential need is to send men, hundreds of them, to be trained. Fighting aeroplanes for the few aviators who are ready for advanced training are available.

Congressman Crago, of Pennsylvania, scored the obstructionists and defined the responsibility involved in further delaying the training of a large number of aviators when he said on the floor of Congress:

> "I was calling attention to the necessity of our waking up to the importance of this new means of warfare and giving our young men a chance to prepare themselves. Let us not put ourselves in the position where Kipling placed the English people when he spoke of them as:
>
> 'Given to strong delusion,
> 'Wholly believing a lie,
> 'Ye saw that the land lay defenseless,
> 'And yet let the months go by.'
>
> "Let us train our young men," continued Congressman Crago, "so that, should the test come, they may not say of us:
>
> 'You pushed them raw to the battle,
> 'As you picked them raw from the street.'"

President Hawley Named Head of Committee to Organize Naval Aerial Reserves

MR. ALAN R. HAWLEY, the energatic president of the Aero Club of America, has been named chairman of the Committee on Aeronautics, to organize the aerial reserves of the Third Naval District.

The committees named by Assistant Secretary of the Navy, Franklin D. Roosevelt, to assist Rear Admiral Nathaniel R. Usher, Commandant of the Navy Yard and senior officer of the Third Naval District, in the organization and equipment of a naval reserve both of vessels and men in this district are as follows:

Yachts—George F. Baker, Jr., Robert E. Tod, George Cormack, Henry S. Beardsley, Stuart Davis, James D. Sparkman, Howard C. Smith.

Tugs and Other Auxiliaries—Eugene E. Moran, Walter H. Pollack.

Personnel—Captain J. N. Patten, Captain Luther B. Dow, Captain J. L. Wright, Vincent Astor, Timothy Healy, Captain T. R. Delahunty, William Greenough, Junius S. Morgan, Paul L. Hammond.

Chairman of Committee on Aeronautics with authority to name ten other members of that committee—Alan R. Hawley.

Inspection and Appraisal of Yachts and Merchant Vessels—Daniel Bacon, David T. Warden, Captain S. E. Turner, Clinton Crane.

Naval Base and Sub-Bases and Equipment and Armament of Vessels—Andrew Fletcher, H. E. Boucher. (This committee will immediately take up the work of getting vessels in commission, installing radio equipment, mounting guns, and supplying the craft with ammunition and signals.)

Communication—U. N. Bethell of the New York Telephone Company.

Publicity and Printing—Walter S. Meriweather. (This committee will be increased to ten.)

The duties of these committees include the inspection and arming of yachts and other craft suitable for auxiliary service and the enrollment of men for the fleet, communications, naval bases and aeronautics.

An advisory board, which heads the list of committees, is made up of Arthur Curtiss James, W. Butler Duncan and Alfred R. Whitney, Jr.

Owners of aeroplanes, aviators, balloonists, and others wishing to enroll in the Reserves should apply to Mr. Hawley, 297 Madison avenue, N. Y.

Bids Opened for Scouting Dirigibles

Washington, March 6.—Bids for eight or more non-rigid dirigible airships for coast and harbor patrol work, opened to-day by the Navy Department, disclosed offers from five companies with prices for one airship ranging from $71,500 to $47,000, and deliveries in 120 days.

The Curtiss Aeroplane Company, of Buffalo, offered to build one machine for $47,000, or four at $40,500 each; the B. F. Goodrich Company, of Akron, Ohio, one for $48,000, or two at $41,000 each; the Connecticut Aircraft Company, of New Haven, one for $47,500, or up to eight at $39,000 each; the Goodyear Tire and Rubber Company, of Akron, Ohio, one for $50,000, with prices graduating down for an increased number to $40,000 each in excess of eight, and A. R. Knabenshue, of New York City, offered one for $71,500.

The machines are designed to operate from shore bases, but could rest on the surface of the water in good weather. The gas bags will be 160 feet in length by 31 feet in diameter, or an over-all height of 50 feet from the bottom of the car to the top of the gas bag.

Each dirigible will carry two men and be equipped for radio communication. They will have 100-horsepower motors, a safe altitude limit of 7,500 feet, and at 600 feet a maximum speed of forty-five miles an hour for ten hours.

THE NEWS OF THE WEEK

Reported Curtiss-Wright Merger Merely a Rumor

The general reports of a Curtiss-Wright merger printed in newspapers during the past week are merely rumors based on past negotiations between the two concerns. Mr. C. M. Keys, vice-president of the Curtiss Aeroplane & Motor Corporation on Monday, March 5th, gave the following statement to the representative of AERIAL AGE.

"Negotiations have been under way for some time looking to a working arrangement, or possibly a consolidation, between our company and the Wright-Martin interests.

"To date, no definite agreement has been reached, and terms published in the daily papers are mostly news to me. Since I have handled the matter entirely for the controlling Curtiss interests, I can speak with authority on that point.

"In general, the sole basis of the negotiations has been a strong mutual desire to put the aeroplane manufacturing interests in a position to meet a national need and emergency. We all need added strength at this moment, and we are doing our best to get it."

Benjamin L. Williams Appointed Secretary Aircraft Manufacturers' Association

Mr. Benjamin L. Williams, of New York City, at a meeting of the Aircraft Manufacturers' Association, held February 27th, in New York City, was appointed Secretary of the organization and will take over the work of furthering the development of the policies of the Association.

This is a phase of the development of the organization of the Association which places it upon a substantial business foundation. There is no doubt that the personnel of the Executive Committee is sufficiently strong to insure satisfactory progress along comprehensive lines and to fully meet the purposes of the establishment of the Association.

Traffic Club Told Mail and Express Should Go by Air

"The United States is as advanced as any country in the world in the development of large aeroplanes," Henry Woodhouse, a Governor of the Aero Club of America, told the members of the Traffic Club.

"Business men want to know what aeronautics can do for transportation. It can do nothing now, for the very reason that we have less than 200 aviators for national defence, when we should have 2,000.

"We have been urging Congress to allow appropriations for mail carrying by aeroplane since 1911. If within the last five years they had done so, we would now have aeroplanes for the transportation of mail and express, also hundreds of trained aviators and planes in reserve for military defence.

"Aeroplanes have been developed with a carrying capacity of fifteen tons. Larger ones could be built if they were only ordered. We have the inventors, the manufacturers, the capital. What the industry needs to be put upon a practical and lasting commercial basis is leaders, such as the men who have built up our great railroad systems."

Du Pont Fabrikoid Co. Purchases Marokene Co.

The Du Pont Fabrikoid Company, with main offices at Wilmington, Del., has purchased the Marokene Company, of Elizabeth, N. J. The Marokene Company manufactures a material similar to fabrikoid, which is used extensively by the automobile, carriage and upholstery industries.

Mr. R. B. Heyward, who has been assistant superintendent of the Fabrikoid Company's Newburgh plant, will become superintendent of the Marokene plant at Elizabeth, N. J. No changes will be made to the present staff of employees.

The purchaser will make thorough investigations in order to learn if any improvements can be made to the product and if possible will better it, thus upholding the Du Pont emstandard.

All the sales transactions of the Marokene Company will be under the direction of the Wilmington office, and the attention of Mr. J. K. Rodgers, Sales Manager of the Du Pont Fabrikoid Company.

Army and Navy News

First Lt. Clearton H. Reynolds, aviation section Signal Officers' Reserve Corps, assigned to active duty to Signal Corps Aviation School, Mineola, L. I.

First Lts. Walter Wynne, Cavalry; James F. Byrom, Benjamin G. Weir, George Pulsifer, Jr., Thomas J. Hanley, Jr., Benjamin W. Mills, Infantry; Clinton W. Howard, Field Artillery; Joseph T. McNarney, 21st Infantry; Earl L. Naiden and Harry B. Anderson, Cavalry, to Signal Corps Aviation School, San Diego, for examination for rating as junior military aviators in aviation section Signal Corps.

New Certified Pilots

Successful in passing the required tests, twenty applicants for pilot certificates have been granted aviation licenses by the Aero Club of America. This brings the number of certified pilots up to 736. The new pilots are:

Lester J. Williams, of the Christofferson School, Redwood City, Cal.

First Lieut. Benjamin C. Weir, U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

First Lieut. Benjamin W. Mills, U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

Lieut. Earl La Rue Naiden, U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

First Lieut. C. W. Howard, U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

First Lieut. Joseph T. McNarney, U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

Lieut. H. F. Wehrle, N. G. West Va., of the Signal Corps Aviation School, Mineola, N. Y.

Carl Carlstrom, of the Atlantic Coast Aeronautical Station, Newport News, Va.

Walter E. Lees, of the Atlantic Coast Aeronautical Station, Newport News, Va.

Kaspar F. Wrede, of the Atlantic Coast Aeronautical Station, Newport News, Va.

First Lieut. George Pulsifer, Jr., U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

First Lieut. James F. Byrom, U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

First Lieut. Walter W. Wynne, U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

First Lieut. Thomas J. Hanley, Jr., U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

First Lieut. Harry B. Anderson, U. S. A., of the Signal Corps Aviation School, San Diego, Cal.

Jay Ingram, of the Stinson School, San Antonio, Tex.

Andrew H. Heermance, of the Atlantic Coast Aeronautical Station, Newport News, Va.

James O. Jensen, of the Christofferson School, Redwood City, Cal.

First Lieut. Norbert Carolin, S. C., N. G. N. Y., of the Signal Corps Aviation Station, Mineola, N. Y.

Lt.-Col. John B. Bennett who succeeded Brig. General George O. Squier as officer in charge of the Aviation Section of the Army

Fliers to Engage in War Game

For the first time in the history of American aeronautics the war game in the air is to be played. As soon as weather permits a fleet of a dozen planes will guard the Government flying field at Mineola against two swift raiding tractors.

As nearly as possible the conditions of actual warfare will be simulated. The lack of weapons and a consideration of atmospheric conditions are the only two things which will differentiate between the game and the fact.

The pilots in the defending squadron are supposed to know only that the territory which they are to patrol—from Rockaway Point and Manhasset to Mineola—is subject to attack. Theoretically, they will be ignorant of the direction from which the attack is to be made or the size of the invading force.

In point of fact, they know that two fliers from Governors Island will attempt during the course of the afternoon to reach the flying field without being challenged. A challenge will mean a theoretical exchange of machine gun fire and is to count as the demolishment of the raider. While on the lookout the defenders will make maps of the section over which they pass.

It is not yet quite certain who will fly. Philip Carroll, instructor at the Governors Island school, will probably be one of the attackers. Among the defenders will be Capt. Carberry, commanding officer of the field; Raynal C. Bolling, who was recently made a major in the Officers' Aerial Reserve Corps; "June" Salmon, one-time Princeton baseball star, and Pilots Miller, Noyes, Stevens, Willets and Harold Blakeley.

Aeroplane to Link American Continents

John Barrett, Director-General of the Pan-American Union, thinks that one of these fine days we will be flying down to Rio and Buenos Aires.

"It is quite certain that aeroplanes can skim over mountains," said Mr. Barrett, "and that they can travel faster than anything else, and it is clear now that aeronautics is becoming one of the most powerful influences for developing real Pan-Americanism. I welcome the new era of the air carrier for passengers, for mails, and possibly for express and freight, which will solve the difficulties of distance, of mountains, of jungles, of climate, which now confront the advocates of the cause of Pan-Americanism.

"No man who has ever traveled over South America," continued Mr. Barrett, "can fail to experience a thrill as he thinks of going rapidly from, say, Cartagena, on the Caribbean coast, or Barranquilla on the Pacific coast of Colombia, to Bogota, its capital, located in the mountain fastnesses, in the course of a few hours by aeroplane, where now it takes anywhere from five to ten days by boat and railway. Again imagine one starting from Guayaquil to go up to Quito, and instead of a two days' ride and a night stop, climbing lofty mountains with all kinds of possible delays and accidents, one makes the trip through the air in a few hours.

"This same picture could also be made to apply to numerous other capitals and centers of Latin-America. Then again, imagine the potentialities of the aeroplane in the great valley of the Amazon. In place of the long, tedious trip up the river by slow steamers, one will be able to go from Para to Manaos, 1,000 miles, and again from Manaos to Iquitos, another 1,000 miles, in two days."

Observation Work Over Miniature War Ground

In an account of how British airmen are trained for their duties at the front, a correspondent of a daily contemporary describes the first lessons that are given in observation work:

On a model landscape laid out on patch of open country were railway stations, tramway lines, level crossings, churches, prominent thoroughfares, and landmarks, indicated by variously painted squares of turf. Enemy positions were distinguished by little green-colored curves. The airmen were temporarily arrested by a supposed "bombardment" from the German trenches. Finally they spotted the target, presumably the headquarters of a German Brigade Staff, then signaled the range to the British batteries, and a moment later gave the word to "open fire." It is by means of this model landscape that the British observers are now coached.

Chicago Activities

By Arthur E. Nealy

There was a special meeting and luncheon of the Aero Club of Illinois in the Auditorium Hotel on Friday last, at which time four visitors to the Pan-American Aeronautic Exposition described the New York show in detail to Chicago aviation enthusiasts. Bion J. Arnold was listed to act as chairman of the occasion, but found it impossible to attend. The other speakers, all of whom were delegated by Governor Lowden to act as Illinois' representatives to the Pan-American Exposition, were Stewart Spalding, Walter L. Brock, Glenn Muffly and R. Lawrence. Mr. Spalding's interesting talk strongly brought out the desirability of attempting to bring such an aviation show to this city. Without doubt an annual aeronautic show will be a regular affair here and in New York within a few years.

Bridgeport Aviation Corps

A new Navy Militia Aviation Corps has been formed at Bridgeport and is composed of twenty-three men headed by John D. Cooper, who is officer in command.

The Naval Militia Training School will be located near Bridgeport, adjoining the Cooper Flying School, which will open about May 1st.

The Governor of the State, the Adjutant General and many other influential persons are very enthusiastic in their support of this organization and are co-operating to the fullest extent to make it the most efficient possible.

The location of the training field is most ideal, as it adjoins the Cooper Flying School, which is situated in one of the few places in the country combining a suitable land field with a perfect body of water for hydro work, at the same time being accessible and having the best of living accommodations close at hand.

Ensign John D. Cooper left Bridgeport, February 28th, in charge of the following men, to report to Pensacola, Fla., for three months' training:

Warren S. Renolds, chief machinists' mate.
Leon S. Moran, machinist, second class.
LeRoy Sweeney, electrician, third class.
James V. Porto, electrician, third class.

Suspended Basket for Zeppelin Observers

There is reason for thinking, says *L'Industrie Electrique,* that the Zeppelins now make use of a fish-like aluminum basket suspended at a distance of 1,000 m. from the vessel and carrying an observer. The basket is furnished with electric light, fed from a small battery of accumulators, and the observer is in telephonic communication with the Zeppelin. In this way it is often possible to arrange between the observation car and the vessel a screen of clouds which hides the latter from view. The dropping of bombs, it is said, is directed from the observer, who cannot be seen from below. The Zeppelin itself is electrically lighted throughout and equipped with a wireless receiving station.

Augustus Post Lectures to Blind Students

On Monday last, Mr. Augustus Post, of the Aero Club of America, spoke to the young men of the Brooklyn Training School for the Blind, and told these bright young men that aviators had to fly in an element which they could not see, namely the air, and that they had to rely upon the same sensitive feeling and development of the tactile sense that is so marked in the case of those who are without sight.

Mr. Post told them of the marvelous things there were being accomplished in the world of aviation today, "turning war upside down," "eliminating the element of surprise," and practically giving victory to the side that had supremacy in the air. He told how hard this country was working to prepare its aerial resources and how the Aero Club of America stood for the training of 1,000 military aviators, and for the use of flying machines to save life by the Coast Guard Service and the establishing of aerial mail routes to provide a reserve of trained men for military duty.

Mr. Post further told them about the large machines built in this country for crossing the Atlantic Ocean, and, since the war, used by England in her 111 coast patrol stations for protection against submarines and torpedoes. The blind young men showed the most intense interest in all of these things which appealed so strongly to their imagination, and were especially entertained by Mr. Post's detailed account of his thrilling trip as aide to Mr. Alan R. Hawley, President of the Aero Club of America, when they won the Gordon Bennett International Balloon Race by their flight of 1,173 miles from St. Louis to the wilds of Labrador, where they were lost from the world for ten days and their friends hardly expected to see them come back alive.

National Preparedness

The Conference Committee on National Preparedness, of which Mr. Henry A. Wise Wood is chairman, gives figures regarding the smallness of the United States Air Service.

The Conference Committee on National Preparedness has prepared a table showing the exact status of our defences. This table, which was compiled from information supplied by the War and Navy Departments, gives the status of army aeronautics as follows:

Total appropriation for the year expiring June 30, 1917, $13,281,666.

Personnel—Officers authorized, 77; enlisted men authorized, 1,800; present number of officers, including those detailed and retired officers on active duty, 96, and present number of enlisted men, 600.

Machines—In service, 67 land machines, 4 hydro-aeroplanes, 2 flying boats; total, 73. Ordered, 206 land machines, 80 hydro-aeroplanes, 16 flying boats; total, 302.

In addition 5 captive balloons for field artillery fire control have been ordered.

One Zeppelin to Be Constructed—A large dirigible of the Zeppelin type is to be constructed by a joint board of army and navy officers. They are not ready to say what it will cost or to give its dimensions.

The status of the Naval Air Service is given as follows: The appropriation for navy aeronautics available under the acts of August 29, 1916, to be available until June 30, 1917, is $3,500,000.

Personnel—Officers authorized, 150; enlisted men authorized, 350; present number of officers, 53, and present number of enlisted men, 163.

Machines—In service, seaplanes, 37; kite balloons, 2, and seaplanes awaiting decision as to disposition, 8. Ordered, seaplanes on order or awaiting acceptance, 40; kite balloon on order, 1; kite balloon awaiting survey, 1, and dirigible undergoing trials, 1.

This table has been made a Congressional document and printed in the Congressional Record.

Self-Guiding Torpedo

A self-guiding torpedo based on magnetic control, it is reported, has been invented by Charles J. Field, of Williston, N. D., a grandson of Cyrus W. Field. Mr. Field in announcing his invention said that it had been turned over to the United States Government. Recent official Government tests, Mr. Field said, credited the device with seven hits out of eight attempts.

Radiodynamics

RADIODYNAMICS. The Wireless Control of Torpedos and Other Mechanisms. By B. F. Meissner, Associate Member Institute of Radio Engineers, Expert Radio Aide, U. S. Navy. D. Van Nostrand Company, New York, 1916. Illustrated. Price, $2.00.

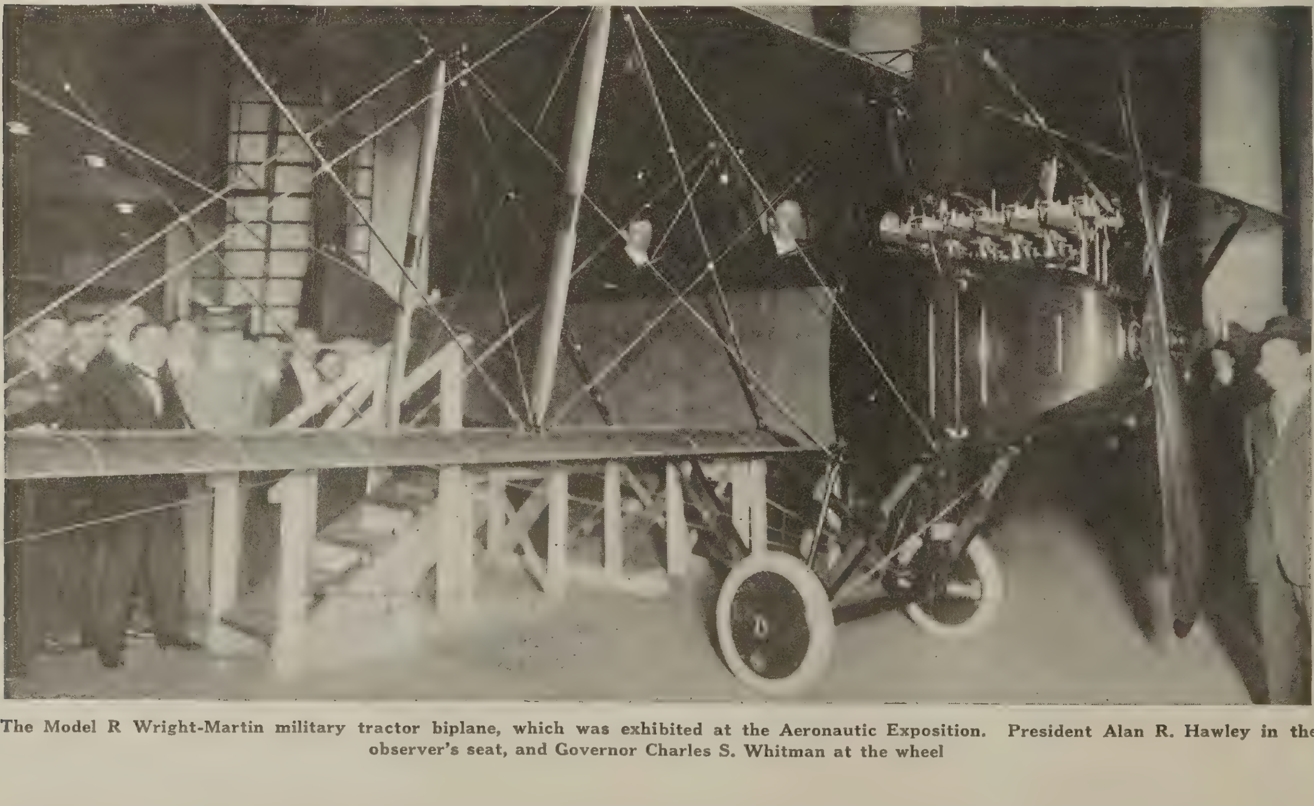
The author presents in an orderly and instructive work the history, methods, and apparatus of Radiodynamics, the art of controlling distant mechanisms without artificial connecting means.

The modern development of wireless telegraphy has led to experimentation along the lines of the transmission of power by radio; the end is not yet, but up to the present time discovery along this line has been in the nature of controlling rather than impelling distant mechanisms. The methods and apparatus used for this purpose are described in an interesting and instructive manner.

It is interesting to note that the chief development of Radiodynamics has been along military and naval lines. It may be that the art is more applicable to war than to peace, but in view of the corresponding development of many other arts and sciences in the same direction, it would almost seem that war calls forth much more than peace the highest inventive genius of man.

The work is replete with diagrams and excellent illustrations, adding materially to the clearness of the text.

The paper, type, illustrations, and binding are of the usual excellent quality produced by the publisher. An excellent work for the engineer, student, or military man, and an ornament to a library.



The Model R Wright-Martin military tractor biplane, which was exhibited at the Aeronautic Exposition. President Alan R. Hawley in the observer's seat, and Governor Charles S. Whitman at the wheel

SCOUTING DIRIGIBLE DETAILS

IN our last issue we printed the complete specifications of scouting dirigibles on which the Navy Department has asked bids. Prices have been asked on one, two, four and eight dirigibles, and an equivalent number of power plants, to be delivered at any point to be designated by the Government on the Atlantic or Gulf coasts of the United States. Final acceptance tests to be completed within 120 days after date of contract or bureau order. The department states that alternate bids with a greater time for delivery and completion of tests may be submitted and will be considered, but the right is reserved to make award on time stated above.

The following are some of the details of the scouting dirigible which pressure of our space prevented our publishing last week.

Instrument Board Arrangements

In scouting dirigibles as specified by the Navy Department the forward instrument board is to be equipped with instruments arranged as shown in the accompanying drawing. They are as follows:

1. Compass.
2. Thermometer.
3. Altimeter.
4. Statoscope.
5. Air Pressure Gauge.
6. Tachometer.
7. Oil Pressure Gauge.
8. Switch.
9. Longitudinal Inclinometer.
10. Clock.
11. Two Manometers to indicate Hydrogen pressure.
12. Air Speed Indicator.
13. Throttle.

The board in the aft part of the car is for instruments to be used in connection with a radio set. Both boards are 24 inches wide and 18 inches in over-all height, with the upper edge curved at a 14-inch radius.

Safety and Gas Control Valve

Gas valves are set to automatically release when pressure at bottom is 1 inch of water. The safety valve is located on top of the envelope.

The maneuver valve is located under the envelope and operates as a safety valve also, but may be opened by means of a line to the pilot's seat.

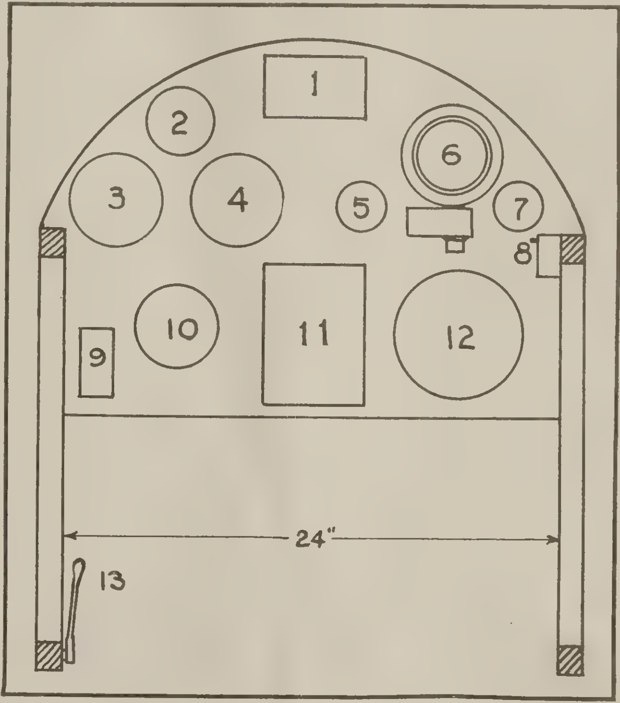
Openings in valves are 20 inches in diameter. Tightness is secured by spring loading which brings the valve against a rubber seat on the valve frame.

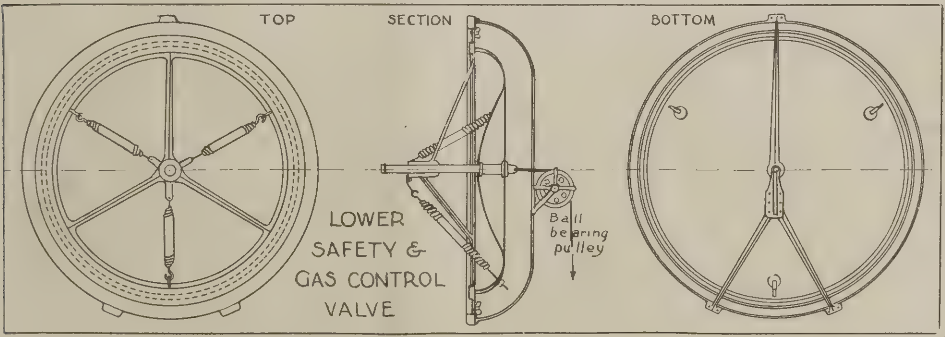
Air Distribution Manifold

The air distribution manifold is provided with four relief valves, each with an opening 9 inches in diameter, which are spring loaded to release air at ¾ inch of water pressure.

Pipe from blower to distribution valve is 7½ inches in diameter, and the wind pipes from distributor to ballonets are of balloon fabric, 8 inches in diameter. Air from the blower can be directed to either or both ballonets by flap-valve dampers operated by cords from the pilot's seat.

All parts of the manifold and valves are of aluminum with the exception of pins, guide rods and springs. Springs are of phosphor bronze, and their adjustment device is gas tight.

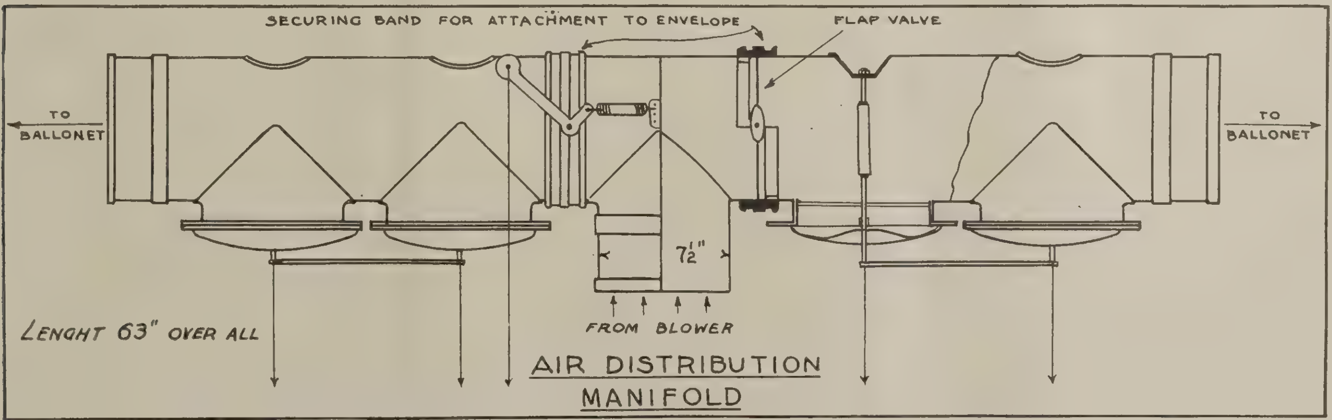




INSTRUMENT BOARD

Lower Safety and Gas Control Valves

Air Distribution Manifold


SECURING BAND FOR ATTACHMENT TO ENVELOPE
FLAP VALVE
TO BALLONET
TO BALLONET
7½"
FROM BLOWER
LENGHT 63" OVER ALL
AIR DISTRIBUTION MANIFOLD

THE AEROMARINE TRAINING TRACTOR

At the recent Aeronautical Exposition the Aeromarine Engineering & Sales Co.'s Sportsman's or Training Tractor was shown for the first time. To the uninitiated, the fine lines of its design were features of attraction, and those who could appreciate fine construction were admirers of its many features of structural excellence.

Under the supervision of Mr. Chas. F. Willard, each part has been given individual attention and tested to the most rigid standards of efficiency. The result has been that the finished machine is able to withstand the severe strains to which it will be subjected in training work, and in addition possesses the desirable qualities of lightness and high performance characteristics.

General Dimensions

Span, upper plane	37'-0"
Span, lower plane	33'-0"
Chord	6'-3"
Gap	6'-6"
Length over all	25'-6"
Weight, empty	1,200 lbs.
Useful load	700 lbs.
Motor, Aeromarine	100 h.p.
Speed range	78-42 m.p.h.
Climb in 10 minutes	3,500 feet

Planes

In form, the wings are designed after the R. A. F. 6 pattern. The disposition of the surface is such as to give inherent stability to the machine without sacrificing the structural conditions of carrying capacity. Leading edge of planes are covered with thin veneer to maintain the correct front curvature.

Ribs are of lightened section, spaced about 12 inches apart. The rib webs are reinforced between lightening holes to protect against shear.

Wing covering is raw Irish linen weighing about 4 ounces per sq. yd., and having equal strength in both the warp and weft. It is placed diagonally on the wing, with seams lapped and double sewed. Seams are covered with linen tape to protect them from the weather. From three to five coats of lacquer are applied before varnishing.

Struts have been proportioned upon the data gathered from a series of tests on full size members and are hollowed to lightness as much as practical, dovetail jointed and wrapped with five hands of linen thread.

In the internal wing bracing, seperate wooden struts and not wing ribs carry the drag of the wings.

Fuselage

As the machine is principally for training purposes, special attention has been given to the body design which allows for replacement of such parts as longerons, etc., with the least possible amount of work.

Longerons are of large section, lightened at points where the strength would not be impaired. Consideration has been given to the rough usage to which the bodies of school machines are subjected, and all wires, turnbuckles and fittings are designed accordingly.

The fuselage is 22'-6" in length, 2'-6" in its maximum width, and 3'-6" in over all depth at the pilot's cockpit. Both cockpits are arranged with a full complement of instruments.

The streamline covering of the fuselage top is quickly detachable, while the cloth covering of sides and bottom is laced on, allowing immediate access to the interior without destroying the coverings.

Tail Group

The stabilizer is divided and mounted on either side of the body. In design it is of the double cambered type. The sections of the stabilizer are quickly detachable from the fuselage.

Elevator planes are each attached to the stabilizer by four hinges. From tip to tip the elevator planes measure 10'-9" across; width, 2'-5".

The rudder is of the balanced type and of streamline section. The frame is formed of steel tubing. From the bottom of fuselage the rudder reaches a maximum height of 4'-0". The balanced portion extends 1'-3" forward of the rudder post, and the main portion 2'-11" to the rear of pivot.

Covering is similar to that of the main planes, with linen applied according to the R. A. F. method, rendering the cloth of the proper tautness, smoothness and security.

Landing Chassis

Field repairs necessary on all training equipment are made with great ease because of the simplicity of the chassis design. The construction of the shock absorber holding device is such as to allow for its complete replacement on the field without the necessity of factory repairs, and the parts, so far as possible, have been made interchangeable from left to right and vice-versa.

Axles are 1½" diameter. Between the wheels the tube is 1¾" in diameter. Walls of the axle in the hubs are 3/16". Hubs have bronze bushings which eliminate the possibility of the wheels seizing.

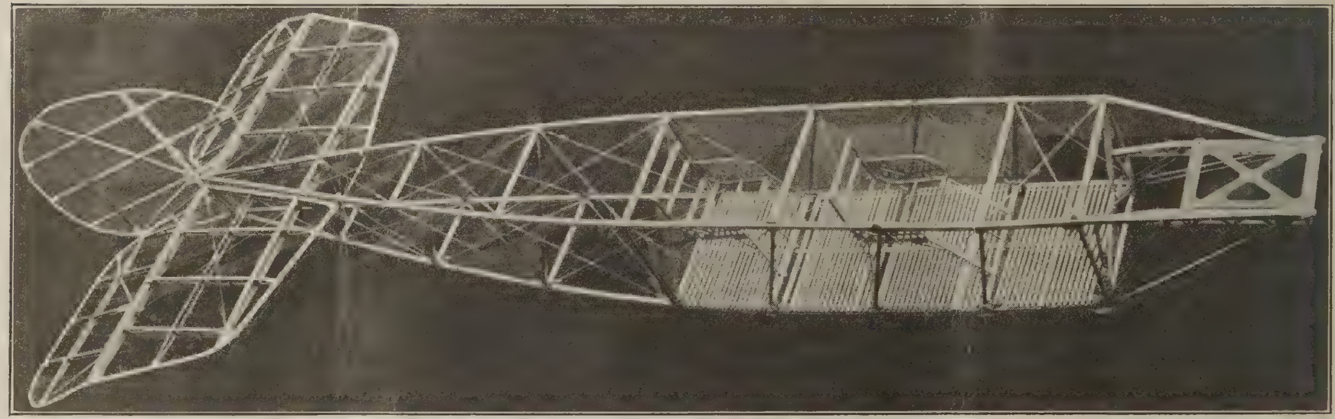
Motor Group

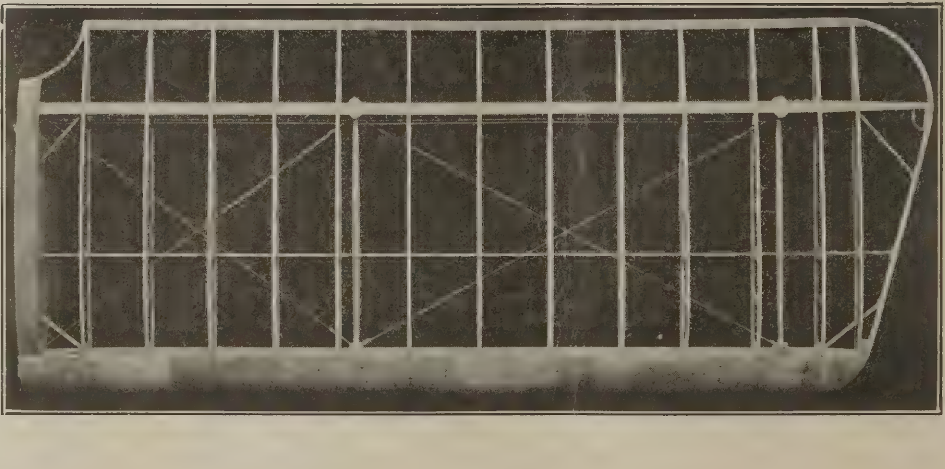
Provision is made for the installation of the new Aeromarine 8-cylinder 100 h.p. motor. The gear ratio is 7 to 4, turning an 8'-4" Paragon propeller with a 6 ft. pitch at 1400 r.p.m. The motor is 4-cycle, with a bore of 3½" and a 5⅛" stroke.

Delco starter and ignition are provided and built in as an essential part of the motor. The carburetor is a Zenith twin-barrel type, supplying gas through a water-jacketed manifold.

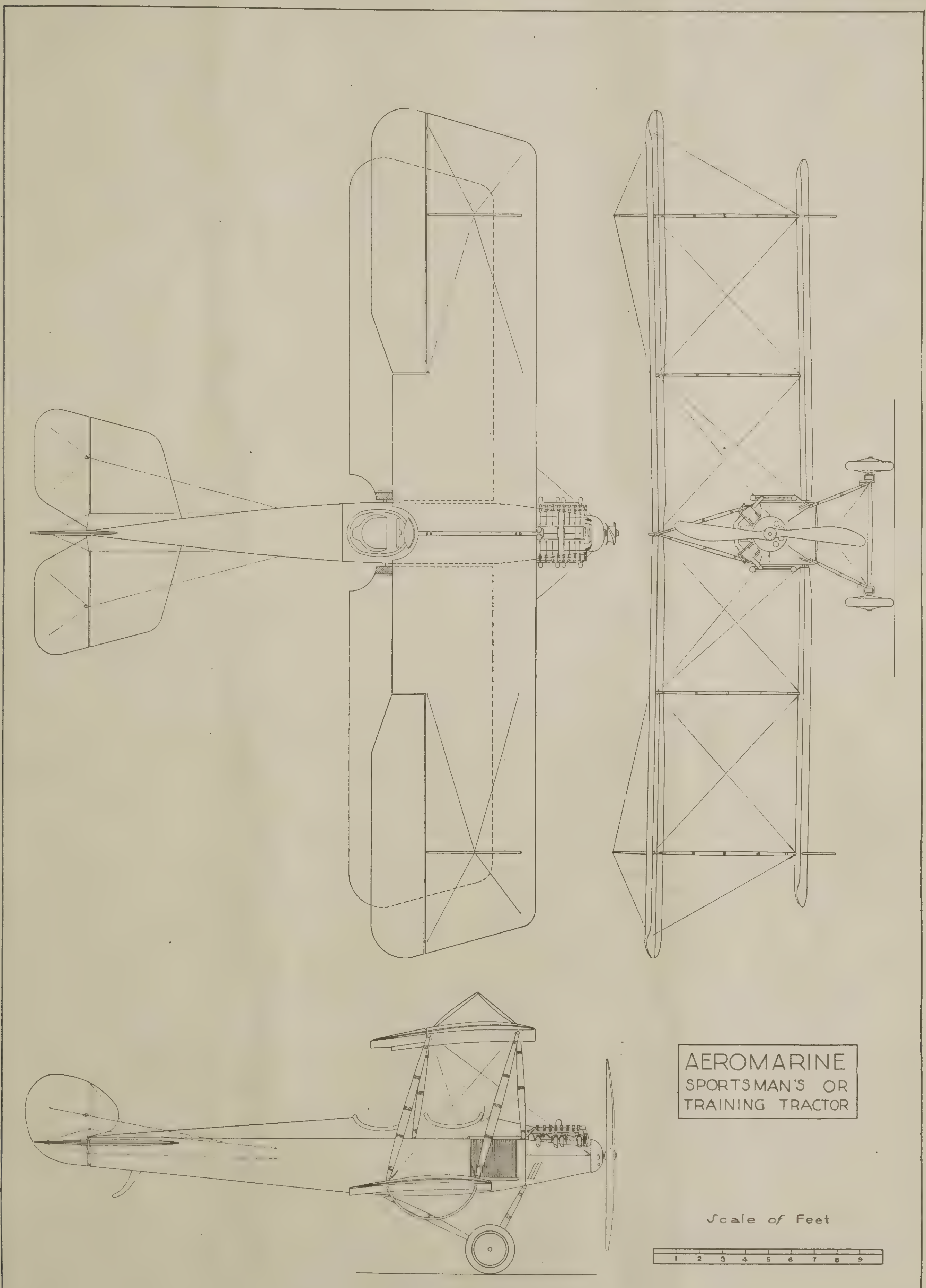
Weight of motor with generator and starter, 450 lbs.

Fuel tanks are constructed of the best tank tin, with lapped and riveted soldered seams, and are fitted with baffle plates riveted and soldered in. Pipes are installed in such a manner as to avoid leakage due to vibration. Drain cocks to the exterior of the fuselage are supplied. Tanks have a fuel capacity sufficient for a four hours flight and can be filled without entering cockpit.





Views showing the internal construction and arrangement of the fuselage, tail group and one of the lower wing sections of the Aeromarine training tractor.



AEROMARINE
SPORTSMAN'S OR
TRAINING TRACTOR

McLaughlin

FOREIGN NEWS

AUSTRIA

Herr Fokker, the designer of the famous aeroplane of the same name used in the German and Austrian armies, has predicted an era of aerial passenger traffic immediately after the war. Speed, he says, is bound to make the aeroplane a popular vehicle of travel, but only for great distances, for which reason the inventor predicts the successful operation of aircraft on routes between Europe and the United States, in direct competition with transatlantic liners.

Herr Fokker believes that the first attempt to fly from Europe to New York will be made immediately after the war, and asserts that route can be traveled in two days at the outside. He is of the opinion that all technical difficulties will be easily overcome.

FRANCE

Aviation has scored another triumph in the decision of the French Academy of Sports to award its annual prize of 10,000 francs to Lieut. Guynemer, Chevalier of the Legion of Honor, holder of the Medaille Militaire, Croix de Guerre, and the subject of a large number of citations in the Gazette. The fact that Lieut. Guynemer has brought down twenty-five enemy aeroplanes is, in the opinion of the Academy, due to his tactical cleverness and admirable courage. The prize, which was founded several years ago by that generous supporter of aviation, M. Deutsch de la Meurthe, to be given for the most outstanding performance of the year, has several times been awarded for aerial work. It was given to "Beaumont," otherwise Lieut. Conneau, for his various long flights on a Bleriot in 1911, while in 1912 it fell to Garros for twice beating the altitude record, winning Ae. C. F. Grand Prix, and for his flight from Tunis to Rome.

It seems that the squadron to which Guynemer belongs is quite a famous aggregation. Up to January 1st the squadron had to its credit 83 German aeroplanes and 3 kite balloons, and the pilots had taken part in 820 aerial battles. Guynemer has brought down a total of 30 German machines. For every member of this squadron that has been killed 6 German pilots have met the same fate.

A list of the accomplishments of this squadron follows:
Lieut. Guynemer, 30 machines; Lieut. Heurteaux, 19; Adjt. Dorme, 17; Lieut. Deulling, 10; Adjt. Chainat, 8, and Lieut. de la Tour, 7.

According to Wolff, the leading German military pilots (not in the same squadron) are as follows:

Lieut. William Frankl, 16;; Lieut. Hohendorf, 12; Capt. Bierr, 10; Lieuts. von Althous and Berthold, 8 each; Lieut. Dessembach, 7; Lieut. Baldamus, 6, and Lieut. Walz, 4.

A meeting was held on January 30th at the Ministry of Commerce of the Committee apointed by M. Clementel to study the possibility of making use of an aeronautical service commercially after the War, especially for the national and international postal services. The object of the committee has been defined summarily by the President, M. d'Aubigny as follows:

"To promote advances in aeronautics, and with this object to contribute in peace towards the development of the aviation industry that originated with the war, and that constitutes a form of national work, and further to exploit the advances made for spreading the influence of French genius."

The special problems, that in view of the committee demand an early solution are to determine the price of service per kilometre, the possible utilization of aeroplanes, the character of the transport service, the practicable routes in France, her Colonies, and Allied Countries, the character of the machine that will be most serviceable, and the organization of stations, relays, etc.

GERMANY

According to reports reaching London, a New Zeppelin, on speed trials at Ghent, caught fire and was completely destroyed. The reports say that the crew of the Zeppelin perished with their craft, and that two Belgians who witnessed the disaster were arrested and taken to Germany.

Fourteen men were killed by the destruction of a French airship, reported to have been brought down by German defensive fire on February 25th. Additional details were given out in an official German report on February 26. The report follows:

"The French airship brought down on Friday night was set ablaze by our anti-aircraft fire. It fell in flames near Weelferdingen west of Saargemund, (in Lorraine). When it landed the ammunition it carried exploded. The crew, consisting of fourteen men, were killed. The damage to the airship does not prevent ascertaining the details of its construction.

GREAT BRITAIN

The wastage of aircraft last month on the western front is described as normal. Mist and fog greatly hampered bombing raids and battery spotting. According to the daily official reports from British General Headquarters, the French Ministry of War and the German Main Headquarters, 89 aeroplanes were lost during the month of February, as compared with 88 in January and 72 in December.

Of the eighty-nine machines lost in February sixty belonged to the German flying service. British airmen claimed forty-one of these and French nineteen. The following particulars of those which fell are official: eight destroyed, twenty-seven driven down damaged, three came down behind our lines and one brought down in air fight.

Allied successes were largely in excess of the losses. Last month twenty-three British machines were reported missing or brought down. The number of allied machines officially claimed by German Headquarters brought down partly in air fights, partly by anti-aircraft fire, is twenty-nine.

An interesting feature in the German statements last month was that for the first time since Capt. Boelke's death in October a German airman was singled out for mention by name. He was Lieut. von Richthofen, who was said on February 15 to have achieved his twentieth and twenty-first victories. None of his previous successes had been mentioned officially.

During February the French airman Guynemer received the well deserved promotion to rank of Captain. He has thirty-one German victims to his credit. Though he did not improve his position in February, he is still at the head of the list of French airmen.

The Ministry of Munitions is extending its plans for the employment of women on engineering work. Classes for training in setting-up and skilled operating on various types of machines are being held in London, and the Ministry has appealed to women of good education and physique, between 20 and 35 years of age to undertake the training. The course will last from eight to nine weeks. Maintenance grants wil be paid during this period, and those who become fully proficient for service in aero-engine work or other munition work may expect a wage of 2 pounds per week.

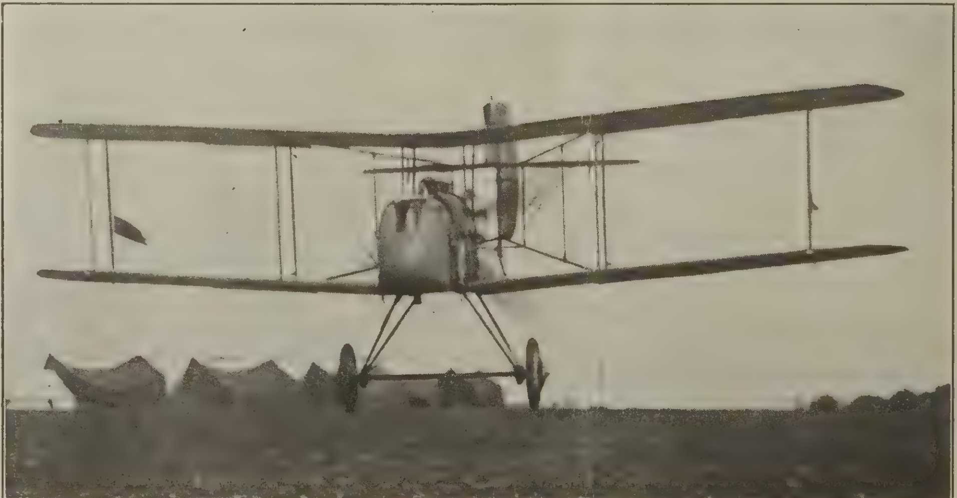
Candidates must be prepared to accept employment in any factory to which they may be sent on completion of their training, and to work during the usual factory working hours.

ITALY

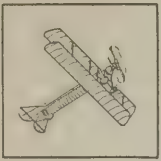
An Italian daily says that on January 10th the pilot Angelo Guenzi, stationed at the hydro-aeroplane base at Gesto Calendre, raised the altitude record for hydro-aeroplanes to 18,000 feet on a F. B. A. built by the Savoia Company, and motored by an Isotta-Fraschini engine.

SOUTH AFRICA

It is reported from Johannesburg that a call for 100 South Africans for the British R. F. C. was met with a ready response at Johannesburg and along the Reef. Captain Miller had permission to recruit 30, but the number was subsequently raised as 100 were required. The Captain has already received 800 applications.

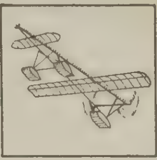


The DeHaviland Scout Biplane, one of the more recent British Pusher-type scouts



MODEL NEWS

Edited by G. A. Cavanagh



CLUBS

THE AERO SCIENCE CLUB OF AMERICA
29 West 39th Street, New York City

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

LONG ISLAND MODEL AERO CLUB
401 Grant Avenue, Cypress Hills, L. I.

BAY RIDGE MODEL CLUB
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DENVER MODEL AERO CLUB
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BUFFALO AERO SCIENCE CLUB
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THE ILLINOIS MODEL AERO CLUB
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455 Murray Ave., Milwaukee, Wis.

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PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Machines With More Than Two Propellers

By V. E. Johnson, Esq., M. A.

One result of the war has been the speeding-up of the development of those particular types of aeroplanes which are especially suitable for fighting purposes. Now it is the essential feature in the development of any fighting weapon to render it, if you can, more formidable than that of your opponent. It is a matter, therefore, of no surprise to learn that the various belligerents are endeavoring to produce a larger, more complex and more formidable weapon than their opponents; in other words, machines of more than one or even two motors and two propellers, of much larger span, and in one case at any rate a double *fuselage*. The latter, which has been used by the Germans, according to newspaper accounts, was capable of flying round and round those attacking it. In other words, it possessed a greater speed factor, apart altogether from any other advantages it might possess in gun-carrying or bomb-dropping devices. In the case of what are commonly called "Ocean Greyhounds" and other swift-moving vessels one always finds them provided with more than two separate engines and propellers.

Taking the case of the aero models, it is, of course, a well-known fact that, given similarity of design, the twin-propellered model is swifter than that having only one propeller.

Now, so far as we know, very little has been done to develop models of a more complex nature, possessing, say, three, or even four propellers and motors. The writer designed, some time ago, a four-propellered symmetrically arranged "flying stick" model. He was unable at the time to carry out many experiments with the same, but sufficient was done to show that such a model could be got to fly, and that experiment alone was necessary to develop it successfully. In flight the model was very swift. The propellers were so arranged that two were pushers and two were tractors. The framework was T-shaped both ends, and the rubber motors crossed one another in pairs. So far as models with a double *fuselage* are concerned, we cannot call to mind any of this character which have actually been constructed. If such have been experimented with we should be extremely glad to have full particulars of them, together with any results which may have been obtained with this species of model. In a sense one may look upon the "A frame" flying stick model as such a type in embryo, and we do not think it is any exaggeration to claim that the double *fuselage* machine (which is said to be so successful in the type referred to) first existed in model form. It may be that models having more than two propellers have been tried, but the point is have they been tried sufficiently, and have any really been designed with an idea to the future development for a full-sized machine? Have they not rather been made with a view to just trying the idea to see what would happen; or it may be even just for the sake of making what was considered to be a "freak" model? Such things have been done. Experiments along such lines are nevertheless well worth conducting, more especially if geared rubber motors were used so as to keep the dimensions of the model more in conformity with those of its full-sized prototype. The best type for such experiment would appear to be a biplane with the propellers *behind* the main plane. The chief points to note with such a model appear to be its speed, stability and gliding properties. The propellers should be those which are provided with a contrivance which prevents them from revolving when the model is gliding.

Paper Models

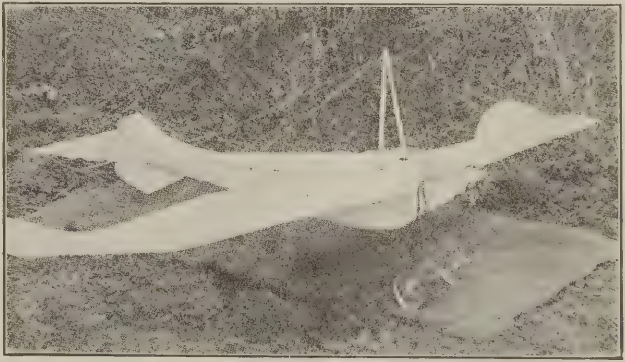
The following letter was received from Mr. Walter Jewell, Philadelphia, Pa., and the information which it contains will no doubt prove interesting to our Model News readers:

"Your editorial in the Model News of February 19th on paper models brings to my remembrance some experiments with paper models which I conducted in 1912.

"At the time Miss Harriet Quimby had met with her fatal accident and a controversy was being held as to the cause of the mishap. Some opinions prevailed that the lifting tail as used on her machine was the cause, so I decided to see how non-lifting tail types would act in recovering from dives, etc.

"I have in mind one machine which I dropped from a balloon at Baltimore from a height of approximately 2,800 feet. I hung it nose down beneath the trapeze bar I was on, and on severing the sustaining cord it dropped vertically about 25 feet, then assumed a gliding angle, descending in large circles of about 200 feet diameter, and when picked up was found right-side up and uninjured.

"The model was rather nose-heavy, but this did not retard its righting effect in the least. That it righted at all into a good gliding angle surprised me. I recall a seaplane which ducked into Lake Cayuga last summer from a height of over 3,000 feet in a straight vertical dive. This machine was nose-heavy and a weight of ten pounds had been affixed to the tail, making the plane a little tail-heavy, and five pounds being taken off the machine acted as aforesaid.



Model of an Etrich Tauber, constructed by Mr. David Hay, described in our last issue.

"As I believe that a machine will right itself with rudder action if the areas are correctly proportioned, I think the open space in the bottom of the fuselage which allows play for the tail skid in land machines is the cause of some of these rudder ineffectiveness situations. That such a glaring example of parasite resistance alone should be allowed in a modernly designed machine is surprising, let alone what this pocket may have to do with control efficiency.

"The model I used was a monoplane type with square enclosed fuselage, Nieuport type wings, about 2-foot span and the same in length, built wholly of cardboard about 1/32 inch thick, load and landing wires being threads and landing threads being attached to a cabane, made of four match-sticks on top of fuselage and load threads directly attached to bottom of fuselage, on which the machine alighted also.

"If the members of the various model clubs have any models which may embody some new ideas in inherent stability, non-capsizable features or anything calculated to be of importance in the advancement of the art, I will be glad to try them out on my professional ascents and make a note of their performance. All models should be sent care of the Aero Club of Pennsylvania, Bellevue-Stratford, Philadelphia, Pa."

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested

Lines of a Mechanic (Censored of Course).

Dese writin' guys, wot tears off verse,
Of t'rills dey feels w'ile flying' high,
Why, say! Dey almost make me curse
Wid there "limpid blue an' sunlight sky."

Dey never t'ink of dirt an' oil,
An' sixteen hours work a day.
Nuthin' to do but toil an' toil,
And den at night ter hit the hay.

It's "Come on yer fool, bring up dat bolt,
"Tighten dat nut, and brace dat stay,
"Yer bleary-eyed, clod-hoppin' unthinkin' dolt,
"Fer a job of ten minutes yer take all the day."

And the dirt and the dust goes into yer eyes,
While yer staggerin' round fer the lack of a sleep.—
And dese poetin' fellers dey talk of blue skies!
Der yer get me cull? Dey make we weep.

Couldn't Quite Figure it Out.

A representative of a New York manufacturer recently called at a large aeroplane factory, and while waiting for his appointment happened to engage in conversation a workman who was working on the body of a new machine.

"Ever made a flight?" he asked the man.

"Nope."

"Why, how long have you been in the factory?"

"Goin' on four years."

"You mean to tell me that after working here four years, and seeing all this flying going on around you that you have never been up?"

"Say, mister," returned the workman, "I've been *making* these machines for four years, and I'm hanged if I know even now why they ever get off the ground!"

Our Own Little War Notes.

Limburg, Jan. 38th.—Twelve aeroplanes were brought down over the cheese factory yesterday. The pilots were found to have suffocated.

Hambourg, Sept 80th.—Six captive balloons were brought down today. The pilots said that they came down for a steak. (Joke.)

Berlin, Nov. 2½.—Upon being interviewed today about his opinion of the aeroplane, Count Zeppelin said that the Zeppelin was quite a machine.

Vladivostock, Oct. 2.—A little luncheon was given today for Kaiser Wilhelm by Czar Nicholas.

Berlin, Aug. 6¼.—It is reported that a little surprise party is being planned for Great Britain, by Count Zeppelin. It is stated that the surprise will take the form of little steel bombs dropped at night over London. The German people regret very much that their purpose was misinterpreted the last time, and that several of the joking Zeppelins were brought down.

Washington, Jan. 3.—All is quite quiet on the Potomac.

The same place.—Orders have been placed for eighteen Odor-Engines. (Orders to destroy them.)

Ditto.—The Government officials are still deciding whether to buy an aeroplane for our coast defense.

"You are nothing but a big bag of wind," sneered the smart aeroplane.

The balloon, in indignation, swelled visibly. "At least," it retorted, "I am self-supporting."—*Boston Transcript.*

Suggestion for an English James Whitcomb Riley: The Zeppel-uns 'll gitcher—ef—yer—don't—watch—out.

Bus More Deadly Than the Zeppelin.

London, Feb. 26.—Darkening London has proved effective in baffling Zeppelins, but it has increased another peril which has proved more deadly than anything the German air fleets have been able to do, according to a statement made in the House of Commons this afternoon.

The chief night danger to London is not the air raiders, but the motorbus, which, since August, 1914, when the streets were first darkened, has killed 954 persons. Against this the Zeppelins have only been able to kill 137 in the same period of time.

Heard at the Aero Show By L. d'O

Foolish questions regarding a seaplane float—

She: Oh, look at the torpedo, isn't it beautiful!

He: Why, Susie, can't you see this is a life boat for aeronauts when they fly over water?

One in a Crowd: What's this supposed to be?

Demonstrator: (suavely) A seaplane float—in other words, a pontoon that is put in place of wheels for flying over water.

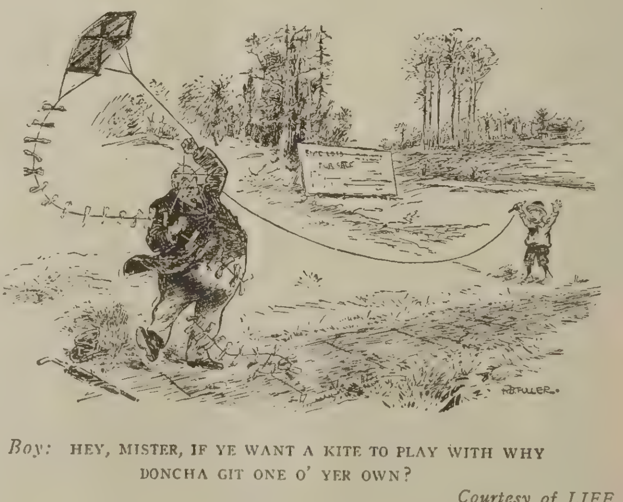
Slightly Deaf Person: You see, Oscar, they use them for wings in flying over water!

A demure young lady stood in front of one of the aeroplanes at the aero show and wondered. She gazed at it in admiration, and at last summoning together all her courage, she spoke to a man standing by.

"Do those wings move like those of a bird?" she asked.

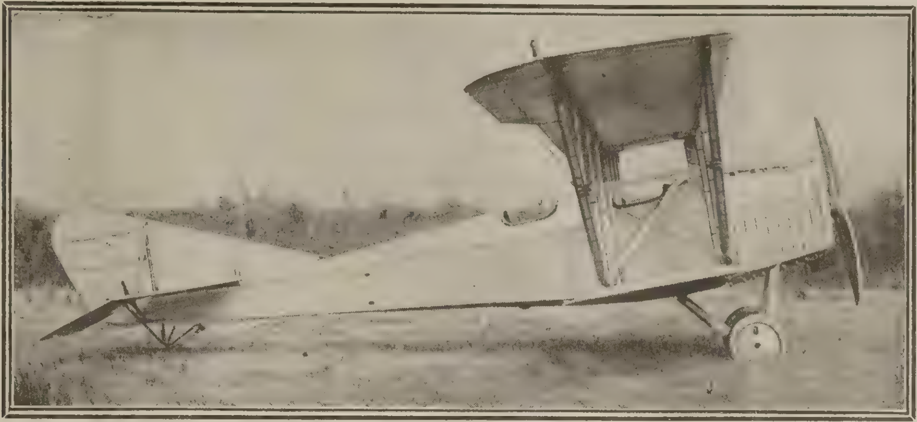
The man then explained to her that such was not the case, and tried to make it clear that the wings simply supported the aeroplane while it was the propeller that sent it through the air.

"Well," she said, "I don't doubt that you are telling the truth, but I have not yet arrived at the state of mind where I can believe it!"



Boy: HEY, MISTER, IF YE WANT A KITE TO PLAY WITH WHY DONCHA GIT ONE O' YER OWN?

Courtesy of LIFE



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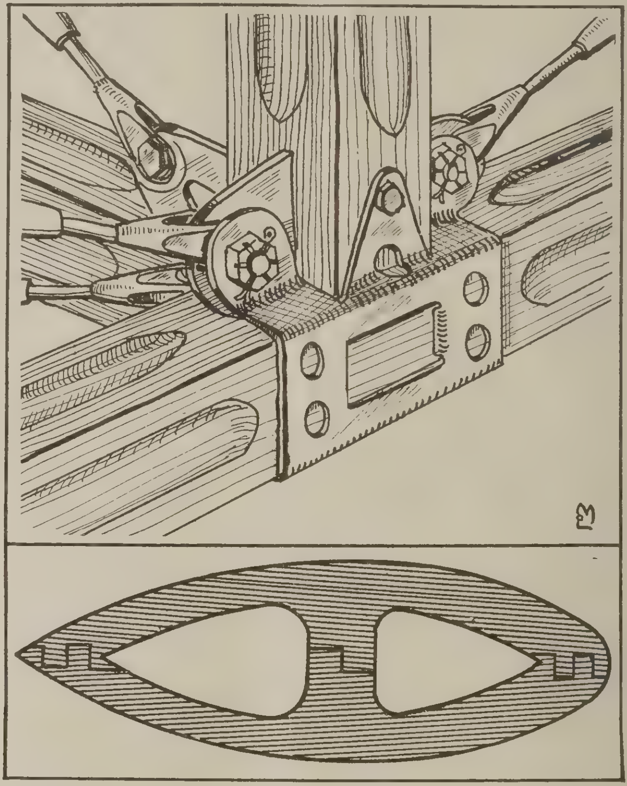
GOODYEAR
AKRON

Aeromarine Construction Details

The fuselage fitting illustrated here, designed by Mr. Charles F. Willard of the Aeromarine Engineering & Sales Co., is used to connect an upright and cross-member to the longeron, without piercing the latter. A single 3/16" bolt goes through the upright, and one through the cross-member.

Another advantage is that the fitting is easily removed without detaching the turnbuckles and disturbing the wiring, when it is desired to replace any of the fuselage members.

Washers are brazed to metal parts where bolt holes are located. Nuts are locked with cotter pins. Bolts are to S. A. E. standards.



The lower illustration shows a section through one of the hollow interplane struts. The beam from which the strut is cut is selected for straight grain. It is sawed vertically in two, the halves reversed and then inverted. This gives uniform weight and strength at upper and lower parts of the strut, with the grain running in such a manner as to resist warping and buckling.

Interlocking grooves give an increase in glueing surface between the halves, and at the outer edge moisture is prevented from penetrating the strut as it cannot pass the first angle presented by these grooves. Furthermore, the grooves prevent shearing fore and aft, a failure likely to occur in cases where a hollow strut is merely glued with flat, smooth contact surfaces.

Although the grooves hold the halves together securely even before glueing, the finished strut is wrapped at intervals with cord. With the many advantages mentioned, and a factor of safety of 11, the weight of such a strut is surprisingly light —a 7'-0" strut weighing only 3½ lbs.

Other interesting details of the Aeromarine seaplane will be given an early issue.

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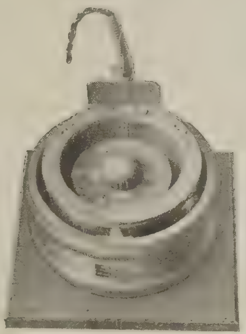

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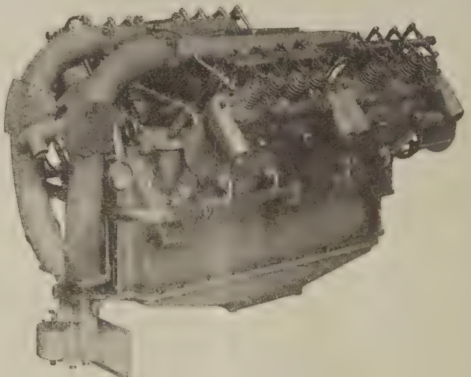

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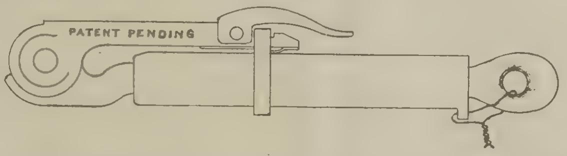

The advantage of this turnbuckle over all other types is that it can be attached and detached without changing the screw adjustment of the turnbuckle. It can easily be attached or detached, at the same time eliminating the necessity of readjustment.

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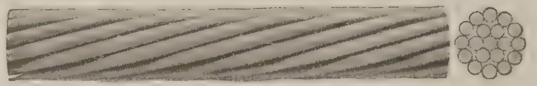

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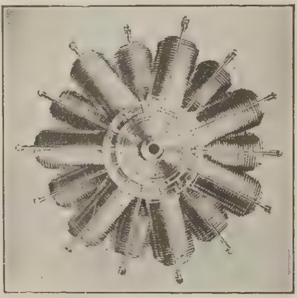

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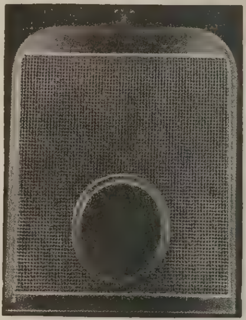

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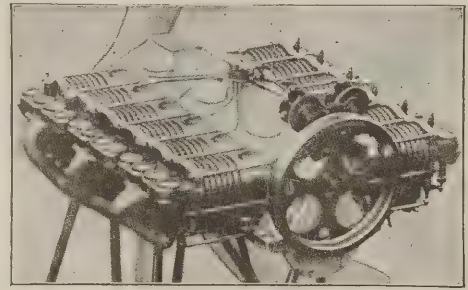

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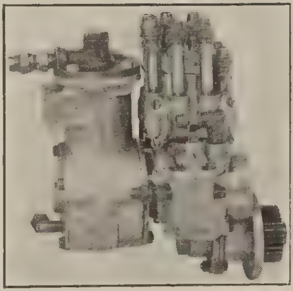

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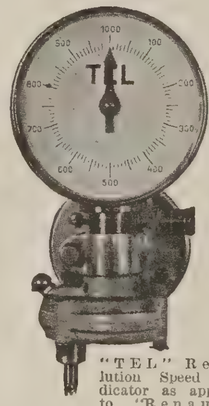

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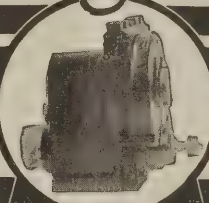

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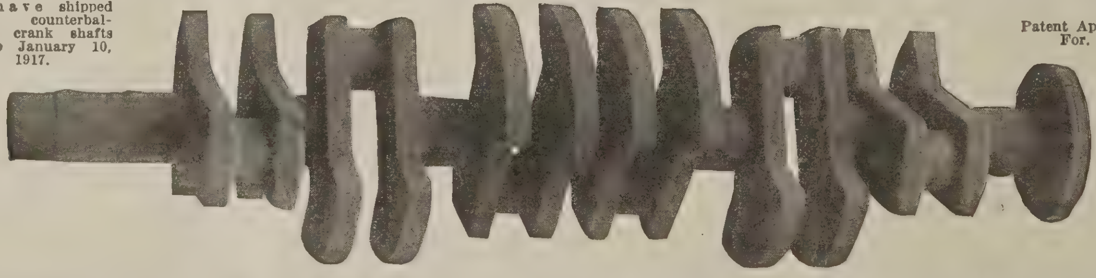

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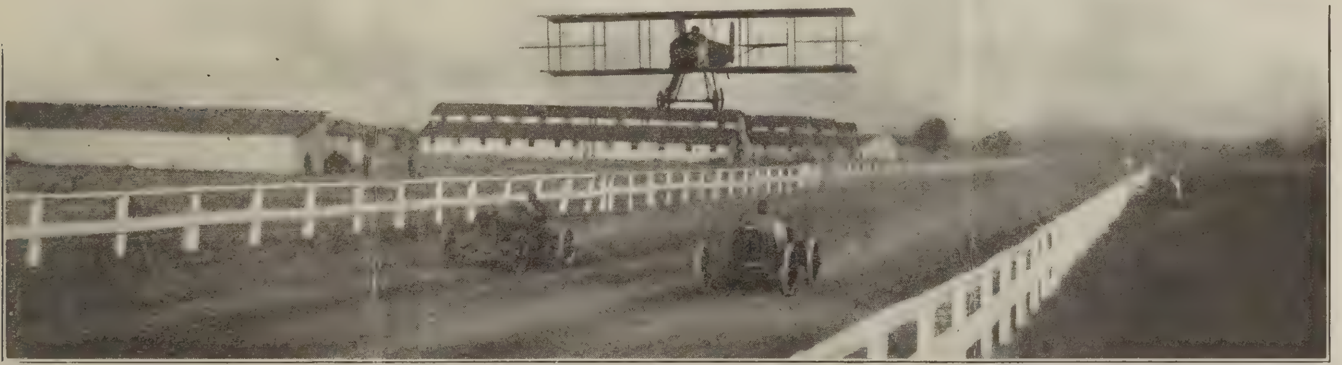

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